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Graduation Project I

Sanad

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DISCLAIMER STATEMENT

This report was written by Sarah Hinno and Marah Direeni, students at the Computer Engineering Department, Faculty of Engineering, An-Najah National University. It has not been altered or corrected, other than editorial corrections, as a result of assessment and it may contain language as well as content errors. The views expressed in it together with any outcomes and recommendations are solely those of the students. An-Najah National University accepts no responsibility or liability for the consequences of this report being for a purpose other than the purpose for which it was commissioned.

ABSTRACT

Sanad Organization. It is an association for children with special needs such as children with autism, Down syndrome, speech problems, and learning difficulties The association provides several services to children, including evaluating and rehabilitating children with special needs and providing psychological, physical, and speech therapy services. The association suffers from management problems, as they are still carrying out their organization operations on paper, and there is no digital system to organize their administrative matters.

So, in order to assist them with their administrative needs, we thought of creating a mobile application. This application will be used by three types of users: administration, specialists, and children's parents, so that each person has specific powers and uses different from the other type. The Sanad app serves three user groups: parents, specialists, and administrators. Each group has roles and features that are customized to meet their needs.

Administrators have the authority to oversee and manage the organization's operations, including adding and deleting children or specialists, scheduling sessions, and accessing detailed information about children and specialists. Admin can efficiently handle vacation requests from specialists, create updates and announcements regarding upcoming events, workshop. Furthermore, administrators can converse with experts directly by using the chat feature.

Specialists utilize the app to optimize their workflow, with features allowing them to view their daily schedules, share notes about children among their peers, communicate with parents, and evaluate children's progress during therapy sessions. This fosters collaboration and ensures continuity of care for each child.

Parents play an integral role in their child's development journey through the Sanad app. They can view session dates, cancel sessions if necessary, and engage in direct communication with specialists to monitor their child's progress and receive guidance on supporting their child's development at home.

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INTRODUCTION

Problem

Manual, paper-based administrative procedures have long presented difficulties for the Sanad Organization, leading to inefficiencies and operational bottlenecks. The organization finds it difficult to efficiently handle its vital responsibilities, such as scheduling sessions, managing children and specialists, and providing information access, in the absence of a centralized electronic system. This old-fashioned method prevents stakeholder collaboration and communication in addition to decreasing productivity. Taking note of these constraints, we created the Sanad website and mobile application, which offer a reliable means of improving administrative procedures. We want to completely transform the organization's operations by utilizing digitalized workflows and improved communication channels. This will guarantee smooth coordination, increased efficiency, and, in the end, better support for children with special needs and their families.

Objective

Our main objective with this project is to create and develop a mobile application to help them with their administrative matters and to make all processes in the organization easy and able to change dynamically.

Scop of the work

The scope of the mobile application involves creating a specialized platform for children with special needs, the app will have three core user roles: administrators, employees (specialists), and parents. Administrators will manage the platform, specialists will access tools for individualized learning experiences, and parents will stay informed about their child's progress. The focus is on personalized content, and a secure environment to support the development of children with special needs, and to make parents easily informed of their child's development.

Organization of the report

CHAPTER 2

CONSTRAINTS, STANDARDS AND EARLIER COURSEWORK

2.1 Constraints

- Learn new programming languages: This is the first time we are designing a mobile application, therefore we had to learn new programming languages like Dart, mobile frameworks like Flutter, and back-end frameworks like Node.js because we hadn't studied them in prior classes. To access the cloud-hosted Firebase Database, we further needed to familiarize ourselves with it and master its usage. MongoDB is an additional database that we study and utilize.

- Features: We made an effort to ensure that our application included every feature that would benefit users in every category, based on the services they require or what they intend to do.

- The constant need to communicate with the association to obtain information and learn about their needs and requirements and to constantly communicate with them to keep them informed of all developments in the application, take their opinion, and try to make the appointment that suits them and hold frequent meetings with them.

2.2 Standards

We used Model-View-Controller (MVC) architectural in our application:

Model:

The Model represents the application's data and business logic. It encapsulates the data structure, logic for data manipulation, and interactions with the database or

external services. The Model notifies the View of any changes in the data, ensuring that the user interface stays updated.

View:

The View is responsible for presenting the data to the user and displaying the user interface. It observes changes in the Model and updates the UI accordingly. In a web application, the View typically consists of HTML, CSS, and JavaScript code that renders the user interface.

Controller:

The Controller acts as an intermediary between the Model and the View. It receives user input and translates it into actions to be performed by the Model or the View. The Controller updates the Model based on user interactions and updates the View to reflect any changes in the data.

2.3 Earlier coursework

Several courses that we took during our education in computer engineering gave us important knowledge and abilities. The basis for studying front-end and back-end programming as well as dealing with actual databases are provided by these courses, which comprised Web Programming, Object-Oriented Programming, and Database. Furthermore, the classes on software engineering and advanced software were very helpful in ensuring that we followed software engineering guidelines when writing our code. Our project benefited immensely from the information gained from these classes, which also expedited the programming process.

CHAPTER 3

LETERATURE REVIEW

Using mobile applications to address the particular obstacles that organizations that serve children with special needs—such as those with autism, Down syndrome, speech issues, and learning disabilities—face has gained popularity in recent years. Key concepts and published works in this field are examined in this assessment of the literature.

The body of literature recognizes that parents play a crucial part in the creation and effectiveness of programs designed specifically for kids with special needs. (Guttentag et al., 2014) research highlights the advantages of using mobile apps to facilitate parent-child interactions and build a connection between families, therapists, and educational institutions.

Security and privacy are vital concerns because the mobile app contains sensitive data on kids with special needs. The adoption of strong security measures to protect personal data and ensure compliance with relevant rules is covered in works by (Oh et al., 2021).

Multistakeholder collaboration is typically necessary for successful deployments.(Horan, 2022) research highlights the importance of ongoing communication and cooperation between administrators, staff, and parents in order to ensure the application's long-term success.

"Enhancing Communication and Care in Special Needs Organizations: A Review of Software Solutions" (Islam et al., 2023). This study examines the software currently in use by organizations that assist kids with special needs, with an

emphasis on administrative, progress tracking, and parent communication features. They draw attention to how important integration and user-centered design are.

The literature analysis concludes by emphasizing the critical role that customized software projects play in helping organizations that support children with exceptional needs. These projects, which prioritize user-centric design, cross-platform frameworks, and collaborative features, present potential opportunities to improve the educational experience for both parents and children. Technology is always changing, which means that in order to meet new difficulties and take advantage of new opportunities in this important field, ongoing research and development are required.

CHAPTER 4

Methodology

4.1 Research and data collection

Through meeting with administrators in the association to find out the procedures required for registering new children and the child's special needs and knowing how to diagnose it, and also through communicating with specialists to know the types of sessions and skills they perform and train children on, and to learn about the difficulties that the association faces and work to alleviate these difficulties.

4.2 Tools, Methods, and Programming languages

4.2.1 Frontend development

- Framework: We carefully considered all of Flutter's attributes before deciding to use it, with its effective performance being the most important factor. Flutter is an open source framework developed by Google. Target systems can interchange code because of a cross-platform structure. Flutter is the only application framework that permits you to share both the code and the user interface. Its open-source nature also means that an infinite number of documentation and courses are available for study and benefit, which speeds the learning curve and facilitates the resolution of common difficulties faced by programmers. To sum up, Flutter is the most straightforward approach to producing code developers that work faster and produce cross-platform mobile apps that function well.

- Programming languages: We utilized the use of Google's object-oriented programming language, Dart. Because we have worked with similar languages in the past, we found Dart to be convenient to work with. It is comparable to C++, Java, and JS. One of the many libraries that Dart offers is one of the reasons we chose it. These libraries facilitate the writing of scripts and increase the productivity and user-friendliness of programming.

4.2.2 Backend development

- Framework: For our backend infrastructure, Node.js was chosen for its versatility and scalability. Node.js' event-driven architecture aligns well with our project's requirements for real-time data processing and handling concurrent connections. Leveraging JavaScript for backend development ensures consistency across the stack and facilitates code maintainability. Additionally, Node.js' rich ecosystem of modules and libraries, along with strong community support, accelerates development cycles and enables rapid iteration. In summary, Node.js powers our backend infrastructure, providing the performance and flexibility needed to support our application's growth and evolution.

- During the development stage of our Node.js application, we employed a particular architecture. The backend source's models and API folders were organized to symbolize the structural elements.

    - Models: The underlying collections and data structures in the MongoDB database were mirrored in the models in our application. We used the Mongoose library, which provides an Object Data Modeling (ODM) layer for MongoDB, to design and interact with our models. Using Mongoose, we were able to create schemas that controlled the behavior and structure of our data.

    - API: We designed and developed a RESTful API to make the backend functionality available. The API featured several clearly defined endpoints, each of which mapped to a distinct resource or action. Following REST guidelines, we employed the required HTTP methods (such as GET, POST, PUT, and DELETE) for every endpoint. Several features were offered by our API, such as sessions scheduling, user data retrieval, and user login.

4.2.3 Website

To enhance our outreach and guarantee accessibility, we supplemented the mobile application with a specific website designed to meet the requirements of individuals managing their diabetes. Through the ease of their mobile devices and

the extensive interface of our website, our users may now address their concerns through a dual-channel strategy made possible by this strategic shift.

4.2.4 Database Design and Configuration

Because MongoDB is flexible, scalable, and schema-less, it is the ideal choice for our database management system given the dynamic data requirements of our project. Its document-oriented NoSQL methodology speeds up development and enables the storing of unstructured data. The distributed architecture and horizontal scalability of MongoDB guarantee smooth handling of massive data volumes. Our data storage infrastructure is built on MongoDB's strong features and broad community support, which allow our application to grow and change with ease.

In our project, we have seamlessly integrated Firebase, a versatile platform by Google, to power two vital functionalities: notifications and chat. With Firebase Cloud Messaging (FCM), we deliver real-time push notifications to users across platforms. Additionally, leveraging Firebase Realtime Database and Cloud Firestore, we've established a robust chat feature, enabling direct communication between parents and specialists with instant message delivery and synchronization across devices. Firebase's comprehensive tools and real-time capabilities have significantly enhanced user engagement and interaction, providing a seamless and dynamic experience within our application.

4.2.5 System Features and Design:

- Log in and sign up feature:

Figure 1: welcome, login and signup

The first page in our application is the welcome screen and then can choose between login or sign up.

User can log in using their ID or email with a password and according to the entered data, it will take them to the appropriate page.

For signup, we ask from user to choose if he is a specialist or parent of the child. Since our application is designed for specific organizations it is a closed system and no anyone can sign up and get into the system this is why we ask you to enter the ID so we compare it in the database to see if this ID exists in the system and can continue the signup. Else or will prevent the user from signing up

-Admin features:

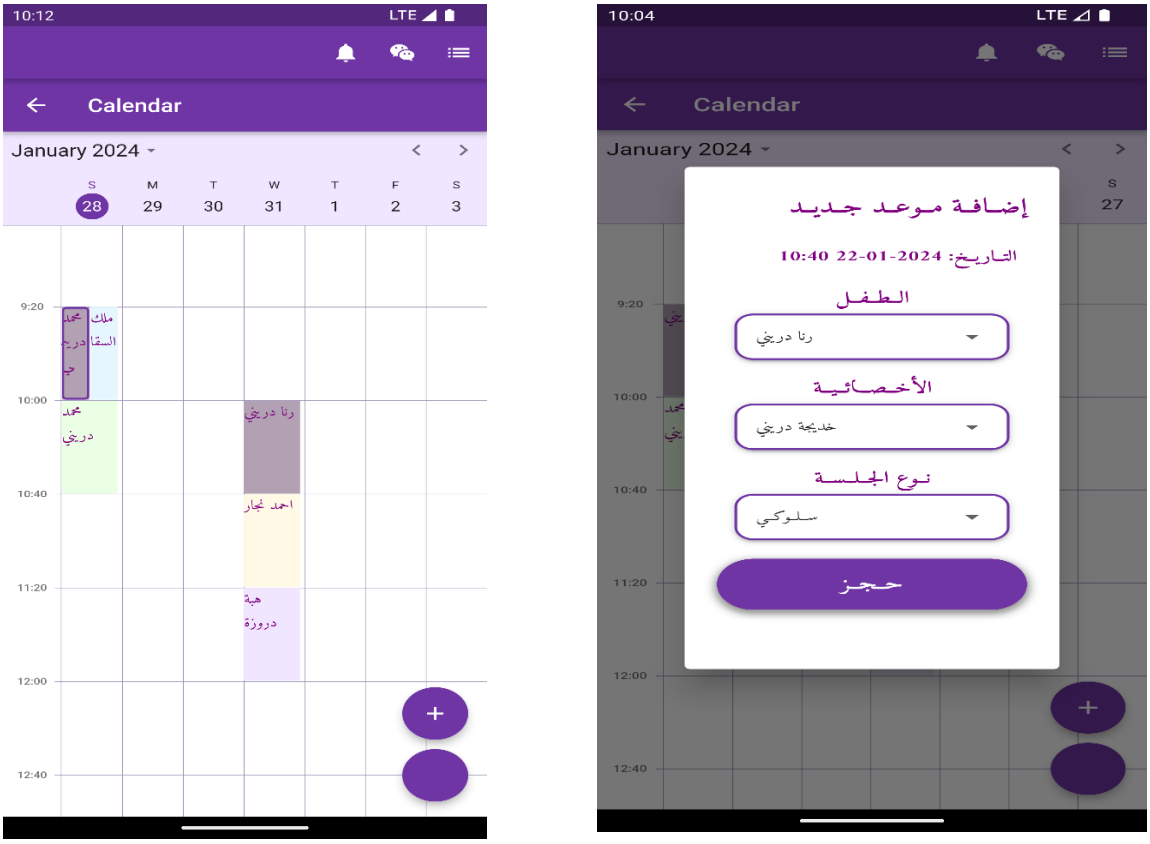


Figure 2: calendar

- **Create sessions schedule**: The admin can add a new session and choose the child, session, and time from this calendar, he can view the details for any reserved session and also can edit the reserved sessions. When the admin creates a new session this session will be reserved automatically at the same time and same details for the end of the month since they used this style in the organization to make it easy for the admin so he is not forced to repeat adding the session at the same time till the end of the month and any time he wants to edit he can do it easily. For building this calendar we used Syncfusion Flutter Calendar due to its extensive feature set, ease of use, and adaptability. It makes it simple to incorporate useful and dynamic calendars into our Flutter apps.

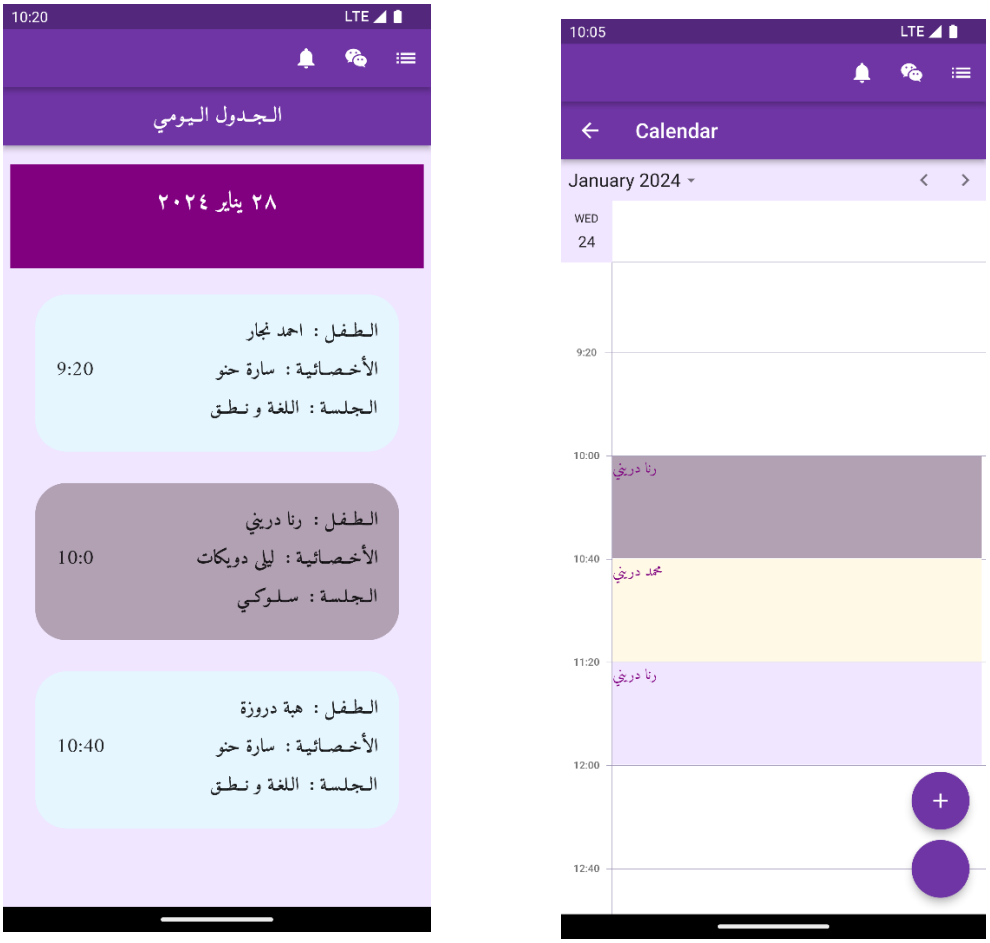


Figure 3:daily schedule

- **View the daily schedule**: The admin can view the session schedule day by day and see details about whose child session, the specialist, what session is this, and the time of the session. Admin can view the daily schedule either from the calendar so he can switch between week view and day view or from the main page which shows the daily schedule.

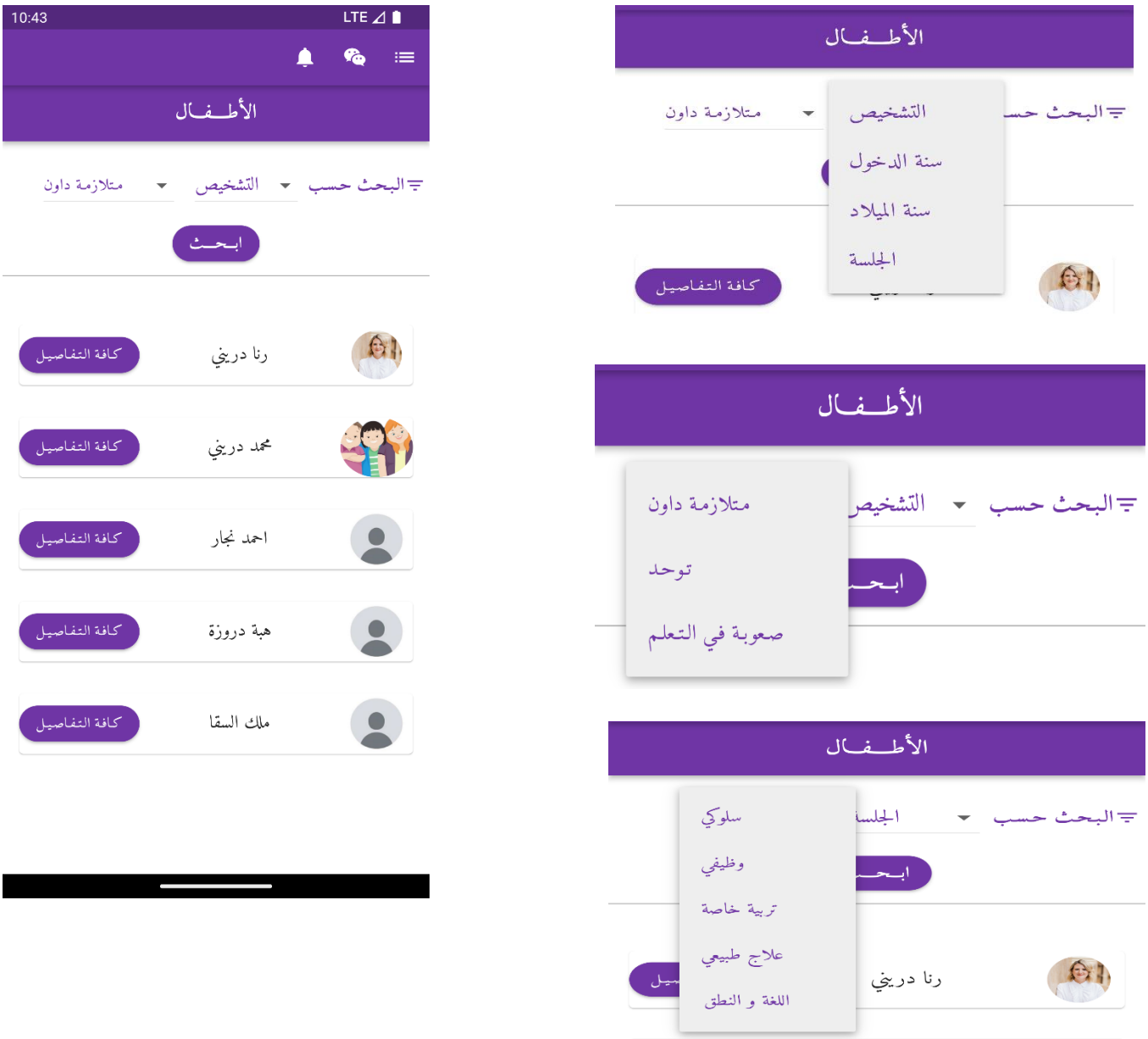
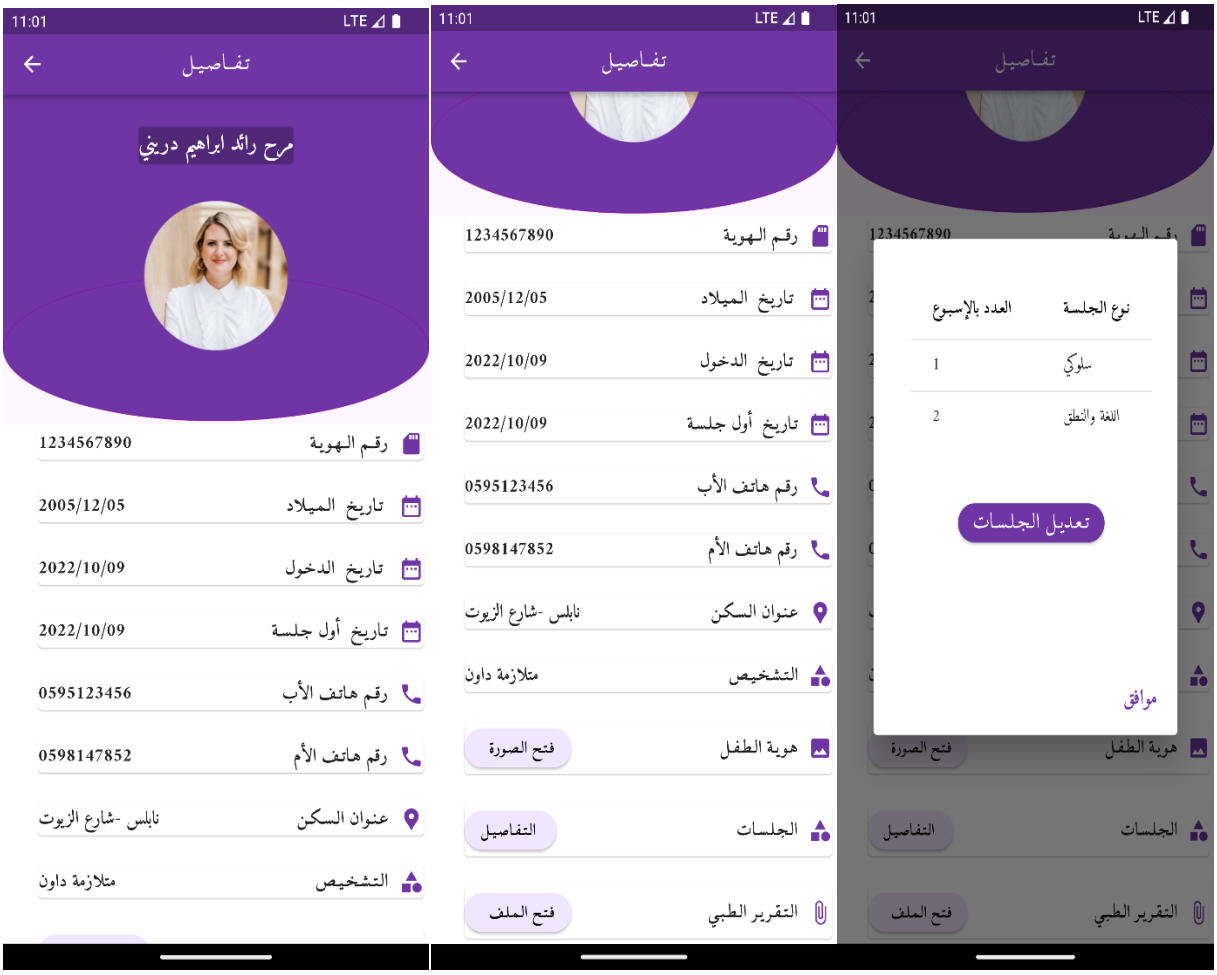
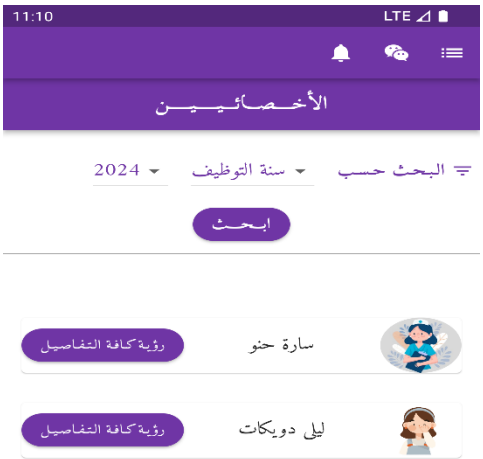


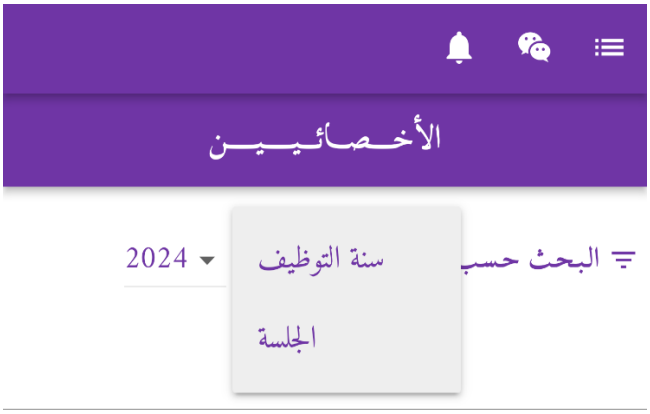
Figure 4: view and filter children

- **See all registered children and filter**: The administrator has the ability to view all registered children as well as filter them according to various criteria, such as the child's diagnosis, the year they were admitted to the organization, their birth year, and the number of sessions. Every category has a value that the administrator can select from a different list, and when he does, the page will reload to display the kids who are connected to the filter



- **View child details**: When the administrator clicks the "view details" button, he is able to view all of the child's information, including the sessions the child attends, the medical report, and other details.





- **View specialists and filter**: The administrator can view all of the organization's specialists' work as children. They can be filtered according to the work year or the sessions they provided children. Once the category has been selected, the administrator can select a value from the other list .

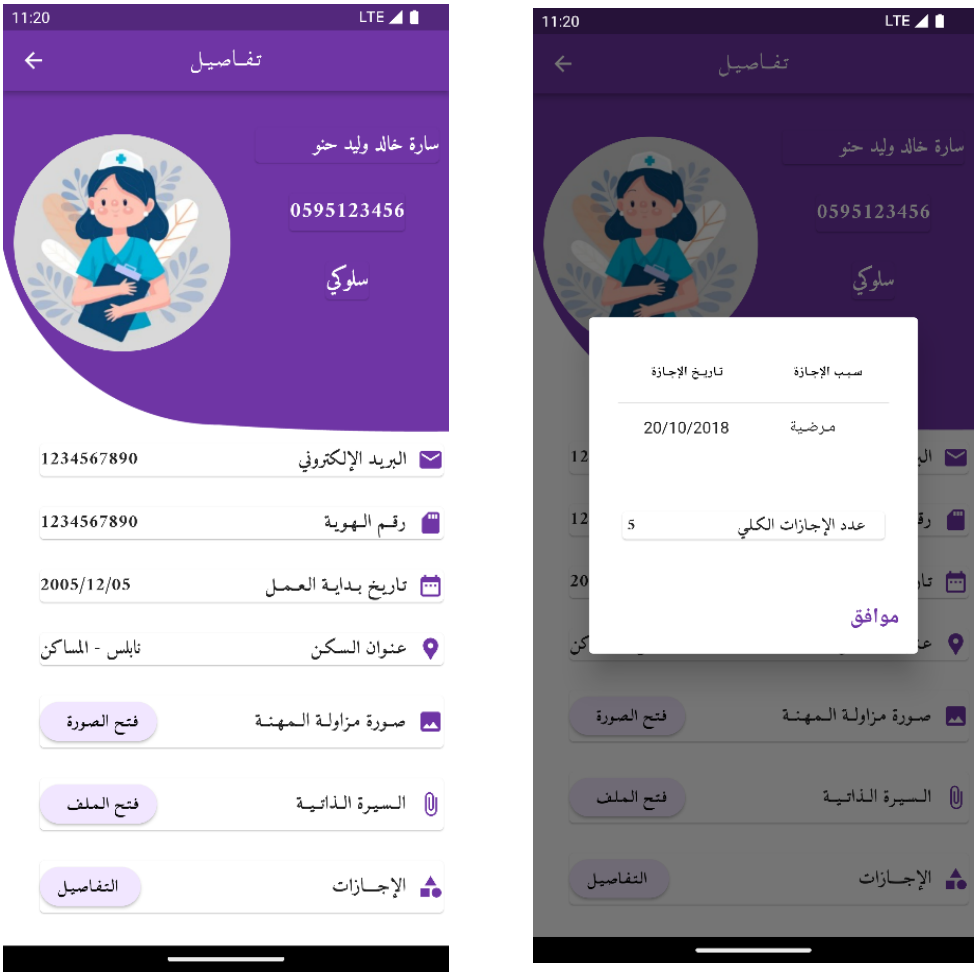


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Figure 5:details about specialist

- **View details about specialists**: The administrator can view information about specialists, including their resumes, copies of their professional licenses, and absences records, by selecting the "view details" button.

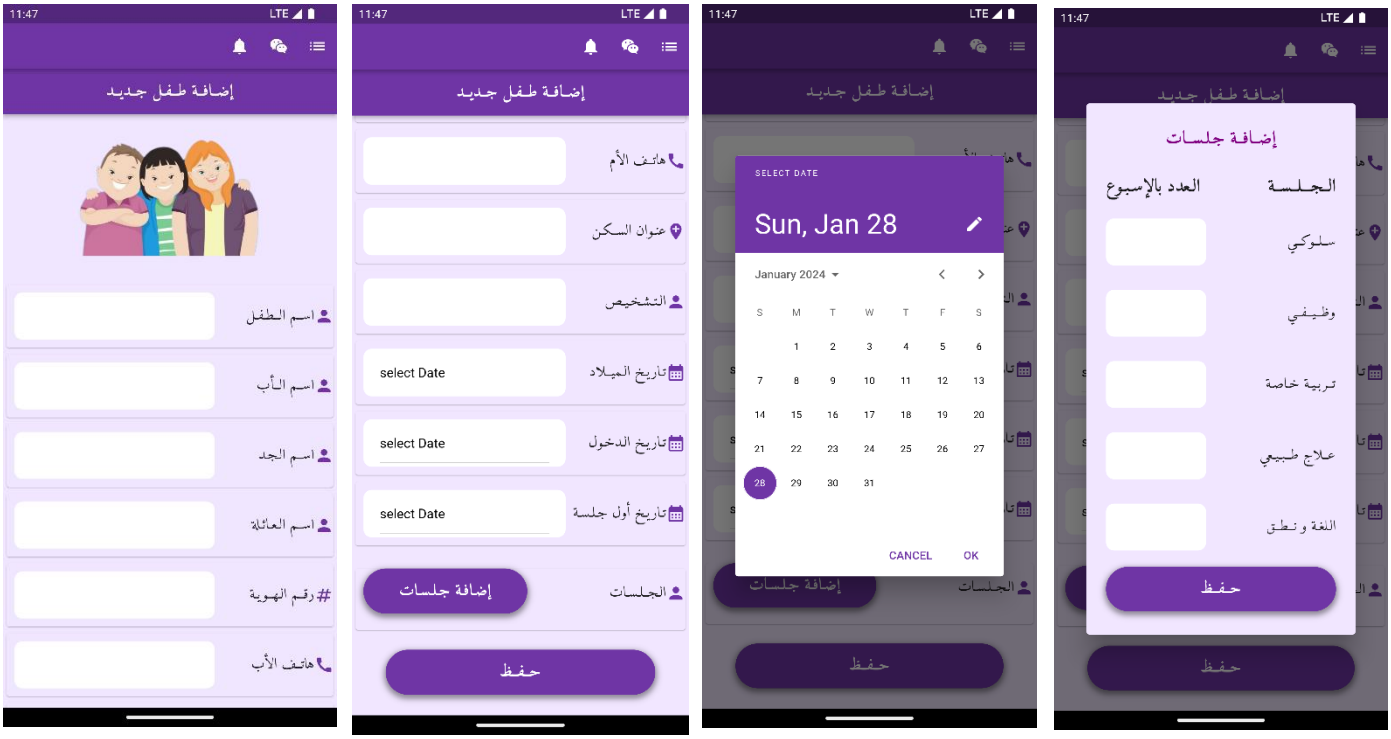


Figure 7:add new child

- **Add new child or new specialist**: Upon a child's registration, the organization's administrator should add him to the system and enter all the required data about the child and indicate the sessions that the child needs, depending on the specialists' assessment after the child has been examined.

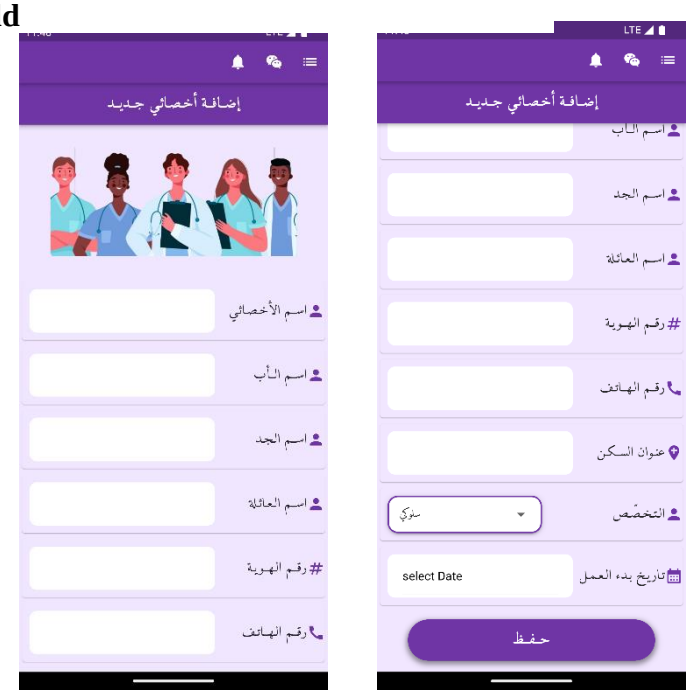


Figure 6:add new specialist

Additionally, the administrator must add a new specialist to the system, enter all necessary data, and assign which session the new specialist will provide when they begin working for the organization.

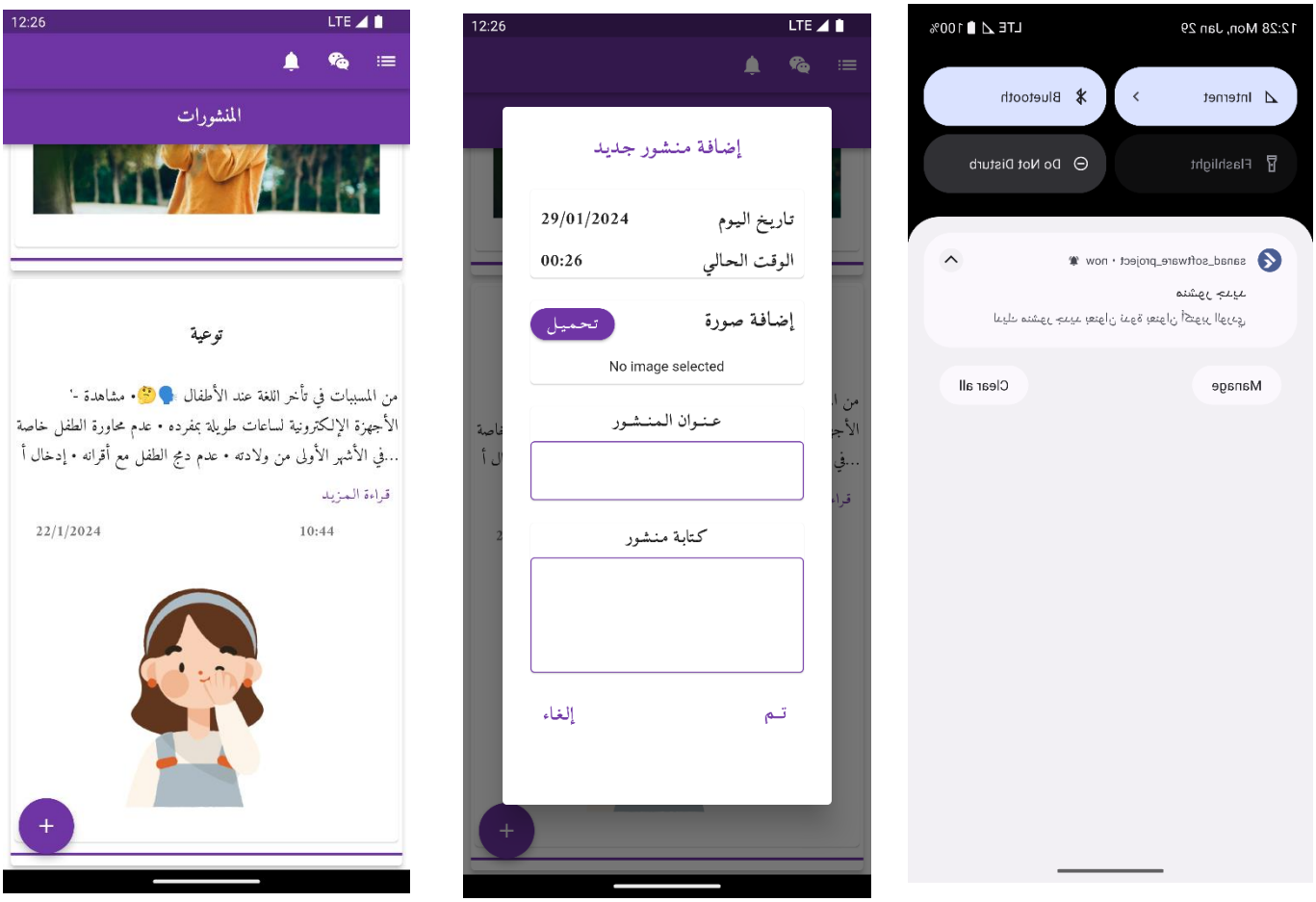


Figure 8:posts

- **Add posts**: The admin can create new posts to announce any events or workshops happening in organizations and these posts are displayed to the admin and children's parents. Admin can also post educational posts to increase parents' awareness of specific topics related to children. When the admin creates a new post a notification message will be sent to all parents to alert them about new posts and when they click on the notification it will take them to the posts page.

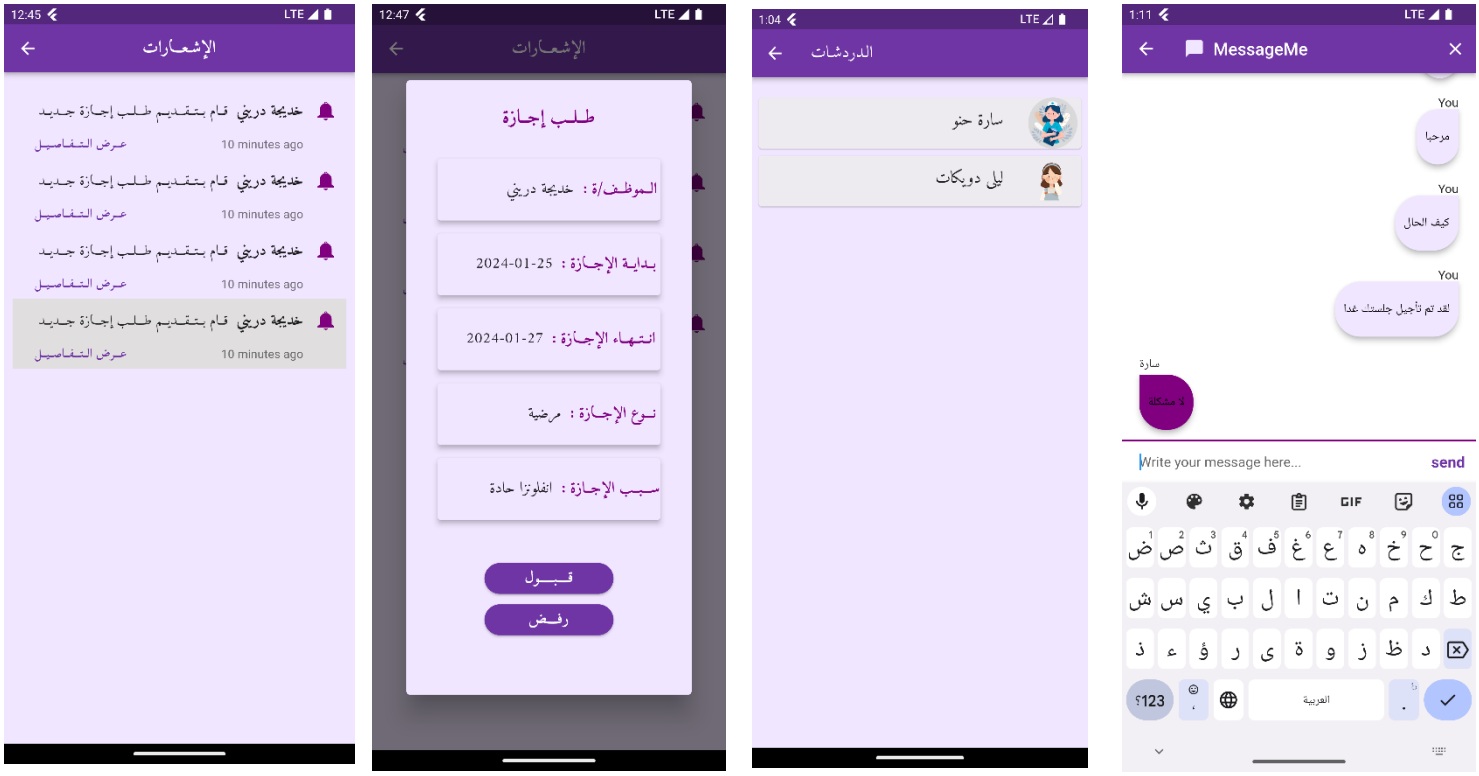


Figure 9: admin notifications and chat

- **Accept or reject vacation requests**: The administrator has the authority to approve or disapprove expert "absence requests" or requests for vacation time. Every time a specialist requests a new vacation, the admin is notified, and on the notification screen, the admin can view all of the vacation requests made by all of the specialists. He can see the specifics of the vacation, such as the specialist's request, the start and end dates of the vacation type, and the purpose of the vacation, by clicking the "view details" button. and it's his choice to accept or reject. A notification message informing the specialist who requested the vacation of its acceptance or rejection will be sent when the administrator approves or rejects it.

Chat with specialists, Through the app's built-in chat feature, the administrator can have direct conversations with specialists. He can view all of the specialists and select one to chat with.

- Specialists features:

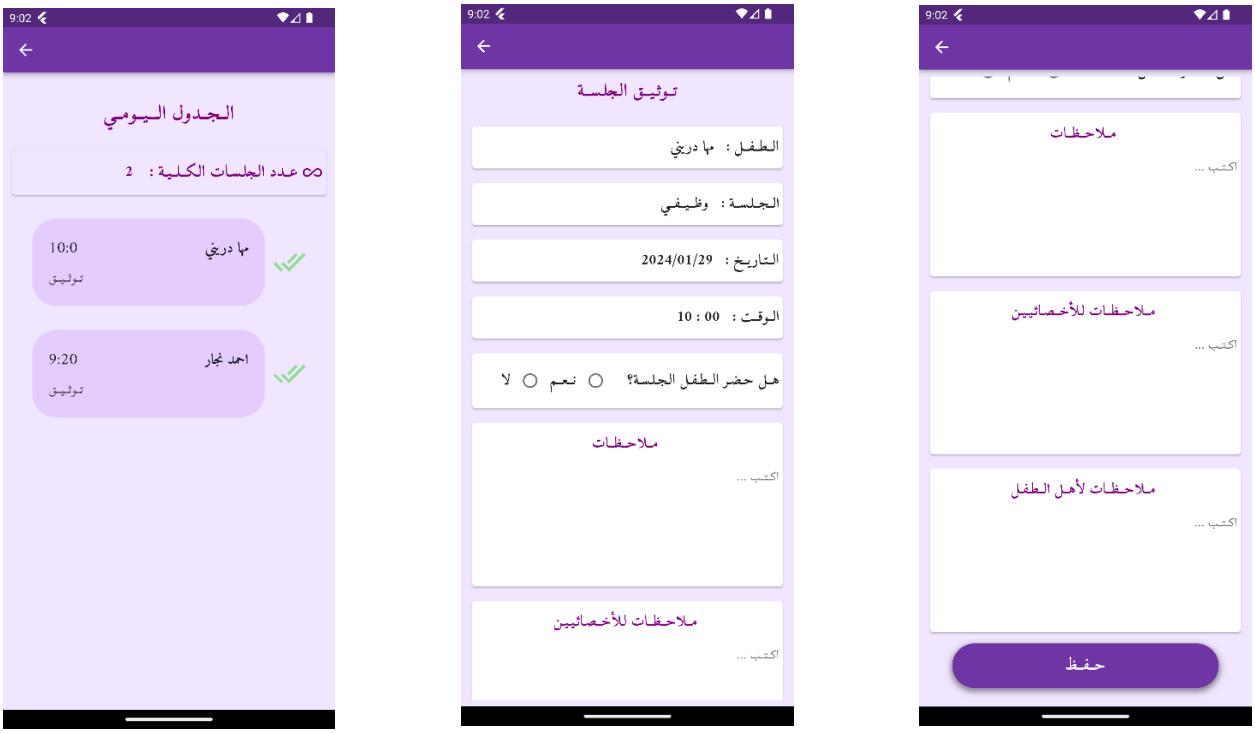
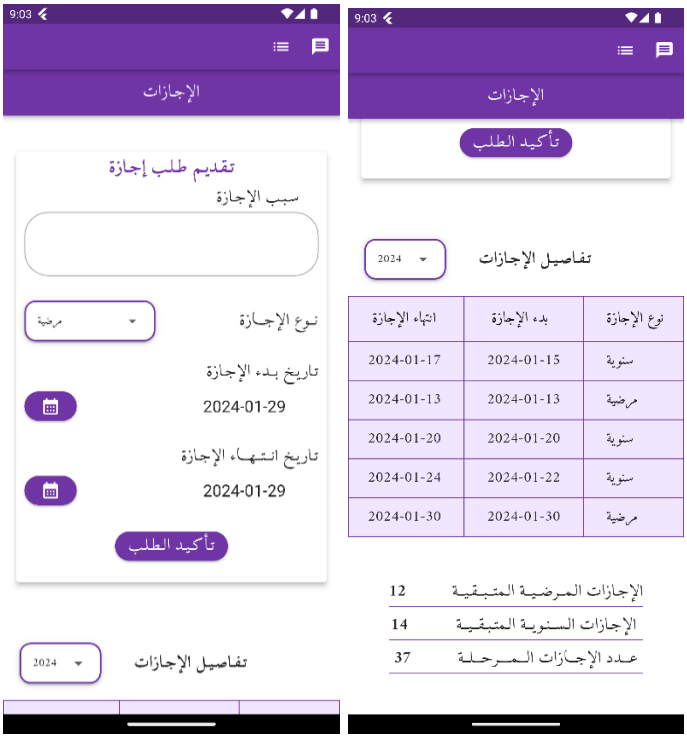


Figure 10:specialist schedule and record sessions

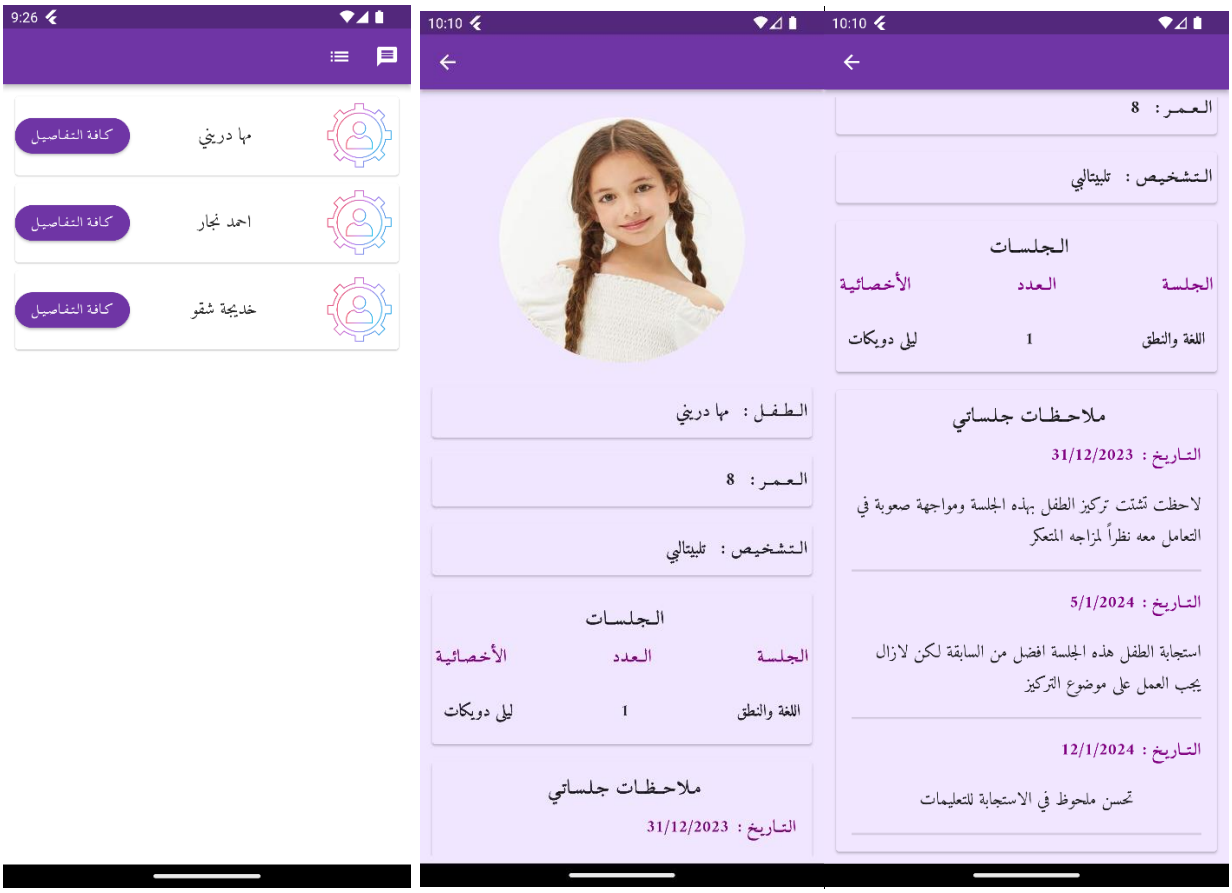
Examine the daily schedule and record sessions: The specialist has the ability to monitor the schedule of his sessions on a day-by-day basis and can record each session as soon as it finishes. Write down the child's participation in the session as well as his interactions with others. In order to enable the child's parents to consistently follow up with their child, he can also write notes for other specialists who work with the child.

- **View personal profile and complete it**: Specialists can view their personal profile and their information and they can edit some information like phone number and email. Also when the specialist logs in for the first time he should complete some steps like uploading a personal photo, his CV, and an Image of practicing a profession so the admin can view them when he wants.

Figure 11:specialist profile

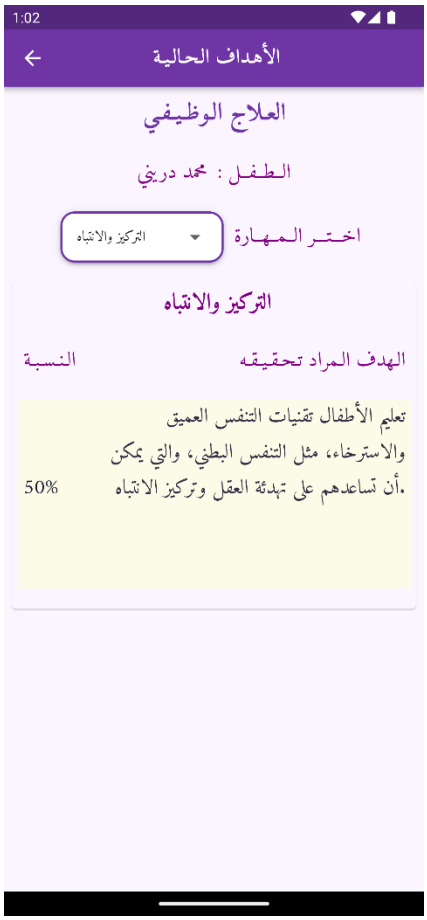


- **Request a new vacation**: A specialist should use the system to submit a request for sick leave or yearly leave. The administrator will then decide whether to approve or disapprove the request. An admin notification is sent whenever a specialist requests a new vacation, informing him of the request. The specialist will receive a new notification once the admin responds to it. The specialist

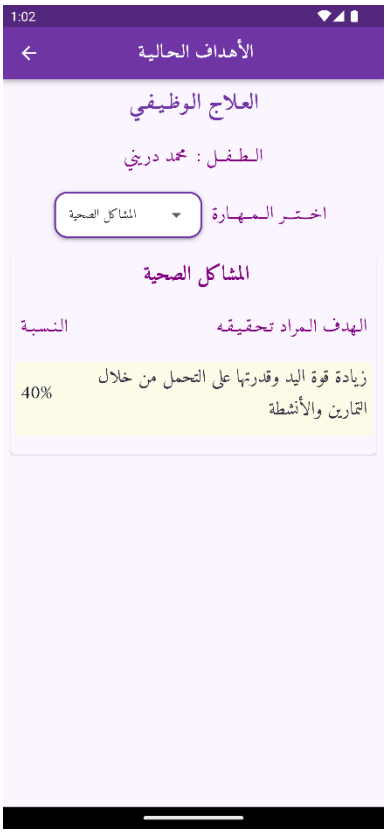


- **View children and note history**: The specialist can see all the children he gives them sessions and he can see a profile page for each one. On this page, the specialist can see what other sessions this child takes and who is the specialist giving them. Also, he can see a history of all his own notes about his session with this child, allowing him to observe the progress made by the child. He can also view the notes made by other specialists who are working with the child, allowing them to take the notes into consideration and ensure that the child development process is integrated.

- View notes from other specialists: experts have access to the comments and notes that other experts have written. This increases expert collaboration for the best possible session outcomes and guarantees the child's integrated development.



- **Writing goals** :A specialist must write down the goals for each child every 3 months. Outlining the objectives the specialist wants the child to accomplish in these three months, along with the goal's percentage of response. Writing goals are for specific skills for each session. In order to help him remember the objectives he set, the specialist can also view the goals he hopes to accomplish with the child over the course of the three months. The specialist can also evaluate the goals that he set during the previous 3 months so that he can evaluate whether the child achieved the desired goal during this period or not. If it is not achieved, it remains for the following period, and if it is achieved, the goal becomes available on the achieved goals page so that the specialist can always review it and stay informed of the child's development.



- **Chat with admin and parents**: a specialist can chat with admin and with parents of children he gives them sessions.

- Parents features:

- **View the weekly schedule:** Parents are able to see their children's weekly session schedule.

- **View personal profile**: Parents have the ability to view their child's personal profile and all of the information contained within. Certain data, such as phone numbers, can be edited by them. When they log in for the first time, they have to finish a few tasks, such as uploading the child's birth certificate, medical report, and picture.

- **View feedback**: In order to better understand their child's interactions during sessions, parents can view the notes and feedback that their child's specialists have provided after each session.

- **View posts**: parents can see all posts from the admin to get to know about all events and updates happening in the organization and they can read all educational posts so they can learn more about matters related to their child and other children. When the admin creates a new post a notification will be received to all parents to alert them about new posts.

- **Evaluate specialists**: Every three months, parents are able to evaluate specialists. Parents are able to evaluate the specialists in certain fields. The purpose of this evaluation is to ensure that each specialist betters himself and that all parents are happy with the services provided to their children.

- **Chat with specialists.**

CHAPTER 5

RESULTS AND DISCUSSIONS

It is a comprehensive system made to make management and administrative duties in organizations that support the education and well-being of children with special needs more efficient. By automating repetitive operations, the program effectively manages administrative procedures and guarantees a more seamless operation. This entails controlling resource allocation, handling documentation, and managing user roles. Administrators are empowered by the technology to efficiently plan and arrange meetings on a managerial level.

The software facilitates Administrative matters related to adding or deleting a new child or specialist, making a schedule that includes the children’s sessions and the sessions conducted by the specialist

Make a schedule that includes the children’s sessions and the sessions conducted by the specialist, and seamless communication between administrators, employees responsible for session organization, and parents actively engaged in monitoring their children's progress. By providing a centralized platform for administrative and managerial activities, the system enhances overall efficiency, reduces manual workload, and fosters a collaborative environment essential for the optimal functioning of organizations catering to children with special needs.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In summary, the software project designed for organizations that support children with special needs has shown to be an essential tool in terms of improving the general efficacy and efficiency of management and administrative procedures. The administration's three main pillars—administrators, specialists, and involved parents—have effectively facilitated communication and teamwork. The opportunity for parents to actively track their children's sessions and track their growth has a good impact on parent engagement, which emphasizes the system's importance in creating a supportive environment.

The comprehensive nature of the software has significantly reduced manual workloads, ensuring smoother operations in handling administrative workflows, documentation, and resource allocation. By providing a centralized platform, the software facilitates seamless coordination between all stakeholders, contributing to an enriched educational experience for children with special needs. These outcomes reflect the successful alignment of technological solutions with the unique requirements of such organizations.

In conclusion, this project has successfully developed a mobile app for the organization. The app has the potential to make a positive impact On the administrative side of the organization.

6.2 Recommendations

Continuous user training and feedback loops should be given top priority in order to optimize the software project for organizations that support children with special needs. Emphasis the importance of strong security protocols that protect data. Work together with specialists in special education while retaining adaptability for future scalability.

6.3 Future work

- Support for Multimedia: Permit users to exchange multimedia files in the chat, including pictures, videos, and documents, message Editing and Deletion, Search Features.

- Provide a virtual room system that will allow kids with special needs to participate in interactive sessions from the comfort of their own homes. This creative approach replicates the advantages of in-person sessions while incorporating real-time outcomes. The virtual classroom encourages participation, offers individualized learning opportunities, and makes it easier for teachers, parents, and kids to communicate easily.

- Provide a reliable method for scanning and validating all application-attached materials, such as resumes, medical records, and personal pictures. By ensuring that the files are clear of malware and viruses, this security precaution preserves the integrity of the program and guards important user information. By using advanced antivirus checks, the system creates a safe space where users can exchange important documents without jeopardizing the functionality of the application or the privacy of the user.

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