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Islamic Dietary Menu Planning System for Breastfeeding Mothers

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Abstract: Planning menus for individuals with different Personal Health Record (PHR) and individuals with special nutritional needs especially for pregnant and breastfeeding women are very challenging. The menus should guide the right amount of food intake for the mothers. This paper examines the user requirements for the development of an Islamic dietary menu planning system for breastfeeding mothers. The system provides guidelines on good nutrition and daily practices for lactating mothers. Most of the websites found in the Internet follow basic principles of menu planning but some are totally contrary to Islamic values. Therefore, this menu planning system not only provides on the calories intake and nutritional content in the food but also in line, according to the Islamic values.

Key words: Breastfeeding · Diet · Islamic · Menu · Mother · Planning System

INTRODUCTION

People's dietary choices are often affected by a variety of factors, including ethical and religious beliefs, clinical need, or a desire to control weight [1]. Researchers have tried to computerize nutritious menus planning tools since the early 1960s [2, 3]. Several menu planning systems have been developed in recent years such as DietPal, DietWizard and Diet Master 2100. However, these systems are mainly used to assist healthy individuals to calculate their calories intake and monitor the selection of menus and not explicitly focused on the system that should consider the major diseases such as diabetes, obesity and hypertension in generating the required diet plans or menus. It also should consider the diseases that have been diagnosed during the post pregnancy phase. The focus of this research is to lead the users back to the Islamic lifestyle according to the Prophet's tradition and dietary practices.

Planning menus for individuals with different Personal Health Record (PHR) and individuals with special nutritional needs especially for pregnant and breastfeeding women are very challenging. This is because during pregnancy, it is vital to ensure optimal health for the mother as well as ideal nutrition for the baby to develop properly [4]. Therefore, the pregnant and breastfeeding women should eat sensibly by following the basic healthy eating guidelines application with a few additional considerations [5]. For that reason, an ideal menu-planning system should guide the right amount of food intake are for each stages of pregnancy or when breastfeeding. Research has shown that fasting in pregnancy appears to be safer both for the mother and baby as long as the mother eats a variety of healthy food and drink plenty of water when she breaks the fast since there are about three quarters of pregnant Muslim women worldwide who chosed to fast during Ramadan.

Active student participation, discussion, observation and reflection are paramount for successful learning. Simulation is one of the up-and-coming tools that can be used to replicate experiences in a certain environment [6]. Simulation engages participation, observation and debriefing [7]. By developing and experimenting with simulation models, one can obtain a better understanding of the overall physical system [8]. The model can be reconfigured and experimented with the system it represents [9]. The limited capabilities of the existing nutrition menus planning systems have lead this study to

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focus on the development of a simulation study of web-based menu-generating system, according to Islamic dietary laws and Muslim lifestyles. The development of the proposed system is also based on the user requirements and needs.

Based on the authors' knowledge, more research needs to be conducted on the system that is able to track and manage the food intake in the daily life of breastfeeding Muslim mothers. Most of the websites found in the Internet follow basic or general principles of menu planning and some are totally contrary to Islamic laws and values. Muslim dietary practices are fundamentally about obeying Allah. Islamic dietary laws provide direction on what is to be considered clean and unclean regarding diet and related issues [10]. Everything is permitted (Halal), except what Allah specifically prohibited (Haram). One of the most important responsibilities as a Muslim woman has towards her children is to nourish their minds, bodies and souls with her milk [11]. Therefore, the nutritious quality of the foods that the women eat is a major importance during breastfeeding [12]. Another limitation of the existing nutrition menus planning systems is that users need to manually search the specific food database and calculate the food calories. In different cases, there is no data found for the food they consumed. There is no single answer to how many calories a nursing mother needs. Thus, there is a need of reliable, accessible and secured nutritious menus planning system that can manage and track the diet plan for the nursing mothers.

In light of the above, this paper examines the user requirements for the development of an Islamic dietary menu planning system for breastfeeding mothers. The system provides guidelines on good nutrition and daily practices for lactating mothers.

Islamic Nutrition: Muslims around the world practice the religion of Islam. The practice of Islam includes observing dietary laws which come from Islamic teachings. Islamic dietary laws define foods that are halal, meaning lawful or permitted. Muslims avoid food and beverages that are Haram, meaning not permitted. However, certain foods are difficult to classify because of the ingredients they contain. Food that meets general Islamic dietary guidelines is called Halal (permissible). Food that is prohibited to Muslims is called Haram (forbidden). The general rule is that every type of food is permissible unless it has been expressly forbidden in the Quran [13].

A healthy diet is balanced with a mixture of all the foods. The variety satisfies all the body's needs for carbohydrates, minerals, vitamins, proteins, fats and amino acids. The Quran and *Sunnah* both recommend food rich in nutrients and prohibit the consumption of substances that have been proved to be harmful, or whose harms outweigh their benefits. Numerous Quranic verses and Prophetic narrations also recommend certain foods, such as honey, dates, figs, milk and olives, for healing properties [14]. The food that we eat has a great impact on our physical, spiritual and psychological aspects. Therefore, it is strongly recommended that parents-to-be stay away from forbidden and doubtful food. This is because the use of pure and Halal food by the mother has its effect on the child. The lack of adherence to this may causes of bad *akhlaq*. Pertaining to the effects of eating Haram food, the Prophet has narrated: "Every time a bite of Haram food enters the stomach of a person, all the angels of the heavens and the earth send curses on him and until the time that the haram bite is in his stomach, Allah does not look in his direction. Every person that eats a bite of haram food is gathering causes of Allah wrath. Then, if he repents, Allah accepts his repentance and if he leaves this world without repentance, he is deserving of the fire (of hell)".

Nutritional Needs of Breastfeeding Mothers: Allah has placed food and water for the child in the body of the mother and has created an amazing system of feeding the newborn child in a manner which is perfect and most beneficial. Breastfeeding are the most nutritionally demanding times of a woman's life. The body needs enough nutrients every day to support the growth of the baby and the maintenance of the mother's body. All the needs of the developing baby come from the mother, either through the foods she eats or the supplements she takes. Breastfeeding women need more essential nutrients than other women. The body needs an additional 500 more calories each day to support the growth of the baby [15]. Mother's health also depends on diet since the mother's body is supplying the nutrients the baby needs, her body still needs the same nutrients as before she was pregnant.

Simulation Process on the Islamic Nutrition for Breastfeeding Mothers: Simulation involves systems and models [16]. A system is defined to be a collection of entities, for an example people or machines, which interact together towards the accomplishment of some logical end [16]. A model is defined to be a representation system development for the purpose of studying that system [16]. Simulation is used before the current system is altered or

a new system is built, to reduce the probability of failure to meet specifications, to prevent under or over-utilization of resources, to eliminate unpredicted bottlenecks and to optimize system performance [9].

A simulation of a system is the operation of a model of the system [9]. The model can be reconfigured and experimented with [9]. The operation of the model can be studied and hence, properties concerning the behavior of the actual system or its subsystem can be inferred [9]. In general, simulation is a tool to evaluate the performance of a system, existing or proposed, under different configurations of interest and over long periods of real time [9].

In this system the mothers can simulate on the menu that they want to eat. Based on the chosen menu, the system will provide information to the mothers in term of the calories intake and nutritional content in the food.

Islamic Dietary Menu Planning System for Breastfeeding Mothers: Software development methodology was used to develop, manage, control and maintain the system. A software process model is an abstract representation of a process that represents a description of a process from some particular perspective as specification, design, validation and evolution [17]. This research employed the waterfall model that is widely used in software development and the detailed explanation about the model is discussed in the next section.

The benefits of implementing this model are simple and easy to use. This model can be easy to implement and manage because each phase has a specific purpose and development occurs in only one phase at a time. The Waterfall model is appropriate for small development projects in which the requirements are well stated [18]. Due to the rigidity of the model, all requirements must be stated explicitly before development begins. If requirements change or are added, the project must start over from the beginning. Due to these issues, the Waterfall model is inappropriate for complex projects. Essentially, the Waterfall model comprises of five phases, namely analysis, design, implementation, testing and maintenance [19].

In Phase 1, which is the requirement analysis and definition defines both functional and non-functional requirements. Functional requirements illustrate the users' interactions with the software which include parameters such as purpose, scope, functions, software attributes, user characteristics, interface requirements and database requirements. Meanwhile, the non-functional requirements refer to the various criteria, constraints and requirements imposed on the design and operation of the software [20]. The main purpose of requirement analysis phase is to find the need and to define the problem that needs to be solved [21]. Some types of system models, which might be produced as part of the analysis process, are data-processing model, composition model and process model. A data-processing model shows how data is processed at different stages in the system by using data-flow diagrams while a composition model illustrates on how some entities in the system are composed of other entities and how they are related whereas a process models shows the principal activities and deliverables in carrying out some process.

The process of planning and problem solving for a software solution is implemented in Phase 2, which is the system and software design phase. The phase defines the plan for a solution which includes algorithm design, software architecture design, conceptual diagram design, concept design, graphical user interface design and data structure definition [18, 19]. In Phase 3, which is the implementation phase refers to the realization of design phase into program code. This phase is where the real code is written and compiled into an operational application and where the database and text files are created [21].

A testing plan is created to describe the unit tests and system tests that will be performed in Phase 4, which is the testing phase. Unit testing is performed on individual software components [22]. It is also known as verification and validation which is a process for checking that a software solution meets the requirements and specifications and that it accomplishes its intended purpose. In fact, verification is the process of evaluating software to determine whether the products of a given development phase satisfy the conditions imposed at the start of that phase; while, validation is the process of evaluating software during or at the end of the development process to determine whether it satisfies specified requirements [23]. Since the unit testing is performed on the individual part of software, system test is an activity to validate the software product as a whole. System test is the stage to find defects that can only be exposed by testing the entire system. Attributes such as external interfaces, performance, security, configuration sensitivity, co-existence, recovery and reliability are validated during this stage [24].

Finally, in Phase 5, which is the maintenance phase is the process of modifying a software solution after delivery and deployment to refine output, correct errors

and improve performance and quality. Additional maintenance activities can be performed in this phase including adapting software to its environment, accommodating new user requirements and increasing software reliability [25].

Approaches in the Development of an Islamic Dietary Menu Planning System for Breastfeeding Mothers: This research uses various techniques to define the requirement desired. These techniques are vital in this research because it helps the research to identify the various requirements needed to develop a reliable, accessible and secured nutritious menu planning online system that can manage and track the diet plan for the nursing mothers. These will later help in developing the entire system. The techniques used are analysis of the existing systems, library and internet search and interviewing the experts and users. By analyzing related system that existed, this will give further understanding of the need of such system. This will help in determining the requirements that could be included into the system based on the user's point of view. Besides a lot of related information regarding the nutritional content in foods is needed for the completion of this project. The information can be found from the library and internet search. Many books and online databases are available in the library that can be used as references.

In addition to that, interview the experts in the area and the users of the system are important in this research. An interview can generate valuable information about someone's live experience and its meanings [26]. An interview can provide the best access to the interpretations that respondents have regarding actions and events [27] and can reach realms of reality that would otherwise remain inaccessible, such as people's subjective experiences and attitudes.

The most common form of interviewing involves individual, face-to-face verbal interchange, but can also take the form of face-to-face group interchange, online methods and telephone surveys [28]. The present research used a face-to-face interview method, as by using this method the researcher can build a close relationship with the respondents and as a result the respondents can be more willing to share their thought freely and deeply. The limitations of this method are the substantial amount of time spent on interviewing, undertaking transcriptions and analyses [27]. Nonetheless, a deep understanding of a phenomenon can be gained based on the overwhelming strength of the face-to-face interview and the richness of the communication that is possible with the key respondents, in various roles and situations of an organisation [29].

Interviews can use structured, semi-structured or unstructured questions, which can be modified or replaced at any stage of the interview process [29]. The present research used semi-structured questions. While questions were pre-formulated there was not blind adherence to them - as it was envisaged that new questions might emerge during the interviews [29]. A degree of consistency was maintained, however, across the interviews as the interviewer always began with a specified set of questions. This method allows the respondent to build insight into any issue that arises during the interviews, as needed [30].

The types of questions used for this research were "issue questions" and "topical questions" [31]. Issue questions are questions regarding the case (which in this study is the features needed for the nursing mothers to plan for their nutritious menus) while topical questions are questions aimed at gathering the information needed to describe the case, which includes the profile of the respondent, the organisation's background and details of the website.

User Requirements for the Development of an Islamic Dietary Menu Planning System for Breastfeeding Mothers: From the analysis of data collected on existing systems, the proposed system will consider individuals diagnosed with the major diseases such as diabetes, obesity and hypertension in generating the required diet plans or menus. This system also considers the diseases that have been diagnosed during the post pregnancy phase. Besides, the main point of the system is considering the lifestyle of individuals; back to the Prophet tradition and dietary practices [32]. The research expected outcomes would be producing a system that is capable of managing the users' dietary intake based on dietary laws in Quran and *Sunnah* and a simulation of system with security features.

Due to that, the system is expected to fulfill the user requirements such as the user interface should be simple and easy to use, the system should enable the user to register and log into the system and the system should enable the registered user to view the information on the calories intake, nutritional content in the food and calculate their Body Mass Index (BMI).

Table 1: Software requirement

Software requirement	Description
Eclipse Juno	Eclipse is an open development platform comprised of extensible frameworks, tools and runtimes for building, deploying and managing software across the lifecycle.
Macromedia Dreamweaver	Macromedia Dreamweaver is a web development application and provides web designers and coders with support for web page creation from designing to coding.
Microsoft Office 2007	Microsoft Word and Microsoft Power Point are used to document, developing plans, assigning resources to tasks and scheduling the process of the software. It also used to present the project as visual presentation.
Operating System	Operating system used as platform to create this software is Windows 8.
Web browser	Google Chrome, Mozilla Firefox and Internet explorer for system development.

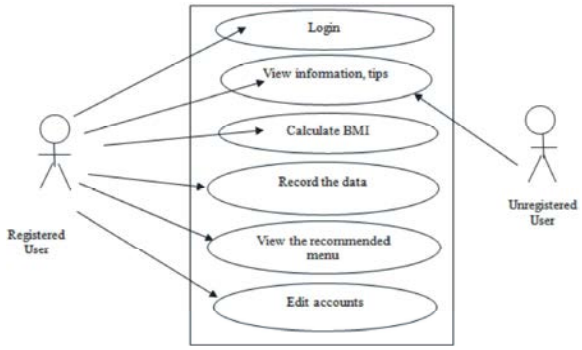

Fig. 1: Use case diagram

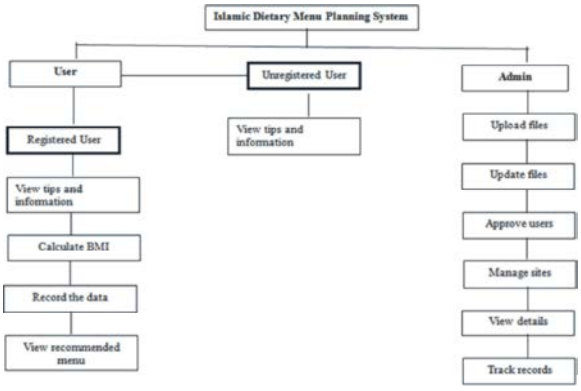

Fig. 2: System hierarchy

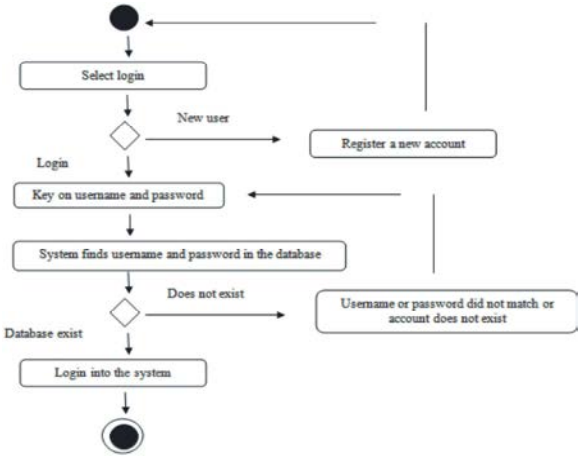

Fig. 3: Activity diagram of user login

In order to perform the system, the minimum hardware requirements are 4GB RAM, 500 GB Hard Disk, Laptop Intel Core i5 are recommended. Furthermore, the minimum software requirements are presented in Table 1.

Functional and non-functional requirements are also the elements in user requirements specification. The system can be developed successfully once the requirements for the proposed system are identified. Functional requirements describe the function of a software system as it should allow the user to perform specific tasks such as register into the system, log into the system, view information and tips, calculate their BMI and view the files.

The system also should provide the non-functional elements to the user such as user friendly interface, easy-to-use Graphical User Interface (GUI) and perform security components such as authentication and authorization. The requirements are illustrated as a use case diagram, system hierarchy and activity diagram of user login in Figures 1, 2 and 3, respectively. The use case diagram shows the interaction between users (actors) and the system (use cases) from the point of view of an external observer while the system hierarchy demonstrates the two external actors - registered user and unregistered users. Activity diagrams on the other hand, are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. It is used to mock-up the workflow of the system being designed, analyzing a use case by describing what actions need to take place and when they should occur, describing a complicated sequential algorithm and modeling applications with parallel processes.

CONCLUSION

This system is developed as an alternative method for the mothers to manage their diet with specific nutritional needs and to have a better understanding on the importance to breastfeed their babies with some

additional features and experts tips. The system is efficient for managing nutritional needs for breastfeeding mothers. Like any other system, it is still ongoing to reach its optimal performance and there are ample opportunities for future expansion and enhancement. An effective system is continuously improved so that the system would eventually satisfy the users in general. The development of this system is expected to benefit others by encouraging them with even more inspiration to produce more similar and advance online system platforms.

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