DESIGNING an INTEGRATED TEACHING PROGRAMMING SYSTEM for KIDS

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Abstract: The programming languages are a set of command according to specific rules. The goal of this project is to design a website for kids to learn the programming languages especially C++, this language will become an important in future life and education, it is important to learn the kids something of this technology to be more intelligent and smarter. We adopted the approach using waterfall model to choose the specific information that help us to design the website then we create the page design as questions of false and true that contains hints when the answer is false. The website have three pages first page Skills then, Quizzes and last one is challenges, the kids can deal with C++ language from the tutorials page, also we add a tools to help them, such as books to know more about C++ language. We give a certificate for the user when they achieved the first three levels. So, we adopted a website that easy to use and highly efficient.
Keywords: C++ learning, Children learning, Kids learning, Programming Languages, learning systems.

1. INTRODUCTION

In today's digital age, knowing how to code can be like being able to read. When we teach our kids to read, write and, add, subtract, we're teaching them ways to interact with the world around us. Considering our world is becoming more and more digital, Filled with smart devices that allow us to turn on our lights 15

minutes before we arrive home or lock our front doors as we leave, learning to code will help kids better to understand and to control in their world. The reality is, anyone can learn how to programmer and write code.

Coding is telling your computer what to do in a language the computer understands and the sooner we accept this, the sooner we can equip our kids with the right tools.

As parents and teachers, we should strive to give our kids the best possible education and tools, so they can thrive in an entrepreneurial and innovation-led society.

The language programming is interesting and useful, and it is a language that is enjoyable for most people and it has many languages such as C ++, C #, Java, JavaScript, PHP, HTML, and CSS. It has different uses (software design, games, websites, applications, and solves some problems in computers). It supports programming devices such as a vacuum cleaner and vending machine. Programming is difficult, and it has a lot of phrases and it is best to learn at an early age like six years.

In the 1980s, there was so-called children's programming appeared in the form of a game called Lugo, It is the first language developed to teach young people coding at MIT by "Simon Papert" and other researchers. It seemed that teaching children the programming useless and impractical but in these days the programming is important, and it has a major effect that cannot be dispensed without. Many people the very successful in programming they were learning programming and dealing with devices from a very early age and have thus achieved success on their peers who started late. These stories and notes have

pushed many to guide their children to learn programming from a very young age.[1] By giving our children the chance to learn to code, we give them the confidence that they can create a particular technology and participate in the development of the world around them.[2]

Perhaps this is what has prompted us to think about the importance of children's learning programming. So, we will focus on some goals to get the best way to teach kids programming, for example, teaching children fundamentals of C++ programming language, learning children how to eject the correct output codes of C++ programming language and teaching children C++ programming language in a simplified and fun way. The site will contain only the C++ programming language learning cycle. It will be available in the English version, and the main stakeholders are children. The main objective of the site is to support available platforms such as NetBeans by directing children to explore and enjoy the programming environment.

Finally, we will use the programming we learned in college to create the site that helps and introduces the next generation, the generation that will be interested and ambitious to develop their programming skills.

2. LITERATURE REVIEW

The current studies aim to identify the role of programming in electronic games aimed at learning and teaching the child by the results of research and previous scientific studies in it.

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[1] Sufyan Al'ahmad "Why should we teach our children programming?" [Online]. Available: https://www.7iber.com/technology/why-we-should-teach-children-programming/ . 17-Feb-2017 [Accessed: 7-Oct-2018].

[2] Gabalawy "What is the importance of teaching programming for children?" https://www.7iber.com/culture/on-the-hegemony-of-the-english-language/. 31-Mar-2018 [Accessed: 7-Oct-2018].

 Programming is one of the most important tools that teach children basic skills, but the large complexity of programming languages, in general, has been a hindrance in the educational process, but with the advent of Scratch, which it is a programming language designed primarily for beginners and children. It allows for creating projects, including animated stories, book reports, scientific projects, games, and simulations. It is a simple, and open source visual programming environment that enables exploration or knowledge. It provides a full range of multimedia tools that can use to create great applications and can do this more easily than other programming languages, where drawing objects are used instead of complex codes that are commonly used.[3] With Scratch, you can share your creations with others in the default Scratch community, it helps young people learn creative thinking, methodological reasoning, and collaborative action and these are important skills. Scratch is one of Lifelong Kindergarten's projects was developed by the Massachusetts Institute of Technology Media Lab (MIT). [4]

Scratch is specially designed for ages between 8 and 16 years old, which it was able to eliminate barriers between learners and programming concepts by overcoming the complexities of codes. When children have dynamic easy tools, they can create countless different tasks and programs and encourage them to design and implement their own projects without being a technical obstacle. In addition, early and simplified learning of this kind of programming will prepare students at the school level to understand programming and gain the basic skills of analysis, communication, collaboration, and learning. These skills are essential for future success.[5]

Alice: It is an educational website widely accessible around the world, which provides different applications like Alice 2, Alice3. NetBeans plugin and Alice3 it's the newest one. Also, it provides different materials such as lessons,

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[3] Hussein Aubari, "What is Scratch? What are its educational uses? " *Chemistry LibreTexts*, http://tiny.cc/vt8m2y. 14-Dec-2014 [Accessed: 23-Jan-2019].
[4] Majed Marji, " Learn to Program with Scratch" http://cutt.us/9rn9W. 15-Feb-2014 [Accessed: 31-Jan-2019].
[5] "Scratch - Imagine, Program, Share" [Online]. Available: https://scratch.mit.edu/. [Accessed: 2-Feb-2019 5:30pm].   [6] "Alice – Tell Stories. Build Games. Learn to Program.," *Alice Community RSS*. [Online]. Available: https://www.alice.org/. [Accessed: 1-Feb-2019 4:30pm].

exercises, and projects, textbook and audio library. All these applications and materials are free to be downloaded in your device. Alice used by teachers at all levels from middle schools or by the younger and used in school classrooms and out of school, It is main usage is ranging from visual arts and language arts to the fundamentals of programming and introduction to java courses. Alice's website is created because the developers were thinking that tomorrow's software development depends on the attitudes of today's kids. Alice's website aims to support all ranges of Alice usage by creating and sharing best practices for all these applications. [6]

The disadvantage of this study is that it did not focus on all the age ranges of children, and therefore we cannot be sure of the impact of programming learning on children in the elementary stages, for example; Codemoji's computer science curriculum for schools allows 1st-8th grade students to learn the basics of web development and coding, including HTML, CSS, and JavaScript, in a fun and easy way, allowing them to create their websites, animations and much more with our unique and adaptable learning platform. This site has a great design, which has a positive impact on the ability of children to learn programming. But the disadvantage of this type of site is its specialization in more than one area of programming languages, leading to the dispersion of children and their inability to absorb the language correctly.

3. METHODOLOGY

A system must be developed using a specific process model that describes the sequence of stages throughout the life of the system. The following is a discussion on selecting the process model for this project is waterfall model, the waterfall model [7] is an example of the process model on which the plan is based in, which all operations activities must be planned and scheduled before work. In this model, each stage of the entire project must be completed before moving on to the next stage, and a detailed document is produced at the end of each stage. It is very useful to use a waterfall model when all requirements are clear, well-known. It is also simple and easy to administer as the stages that do not overlap at each delivery stage that has been identified. The main drawbacks of the waterfall model are the difficulty of accommodating change after the process is underway in principle, which the phase should be complete before moving onto the next phase. And the inability to provide a working version of the system until the later stages of the project life cycle as shown in Figure1.
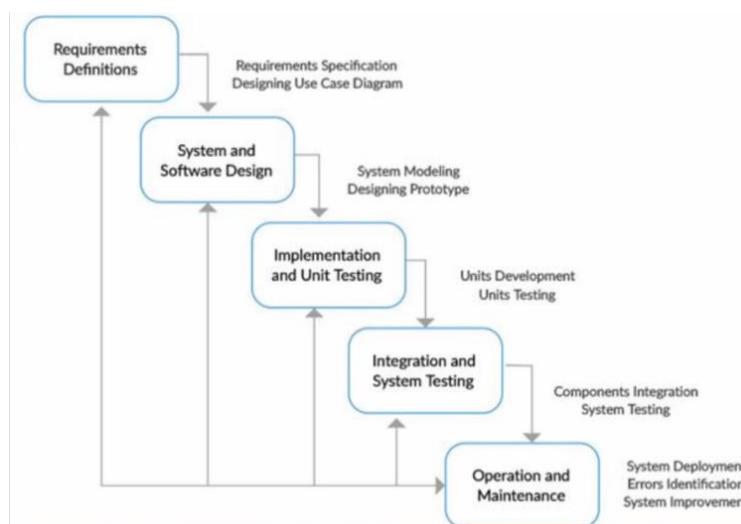
Figure 1: The Waterfall model phases

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7 Phillip A. Laplante; Colin J. Neill , "ACM Digital Library "" Waterfall Model " https://dl.acm.org/. 10-Feb-2004 [Accessed: 15-Jan-2019].

All requirements will be clearly identified before the project implementation stage, it is a website to teach children the programming language C ++ and provide an educational environment in a fun and easy way, our current system may be similar to previous systems, but with some differences. The system will be limited to learning one programming language that includes books which will add to the user basic knowledge of this language and how to write and deal with the symbols and improve the ability to learn to program. Also, the system will give a certificate to the users that achieved the first three levels.

3.1 REQUIREMENTS DEFINITION

The requirements for this entire website have been analyzed, and there is a list of hardware and software requirements that the application will need and use to implement the project. The following equipment is used:

3.1.1 Software requirement

In this part, we are going to list down the important software requirement that is needed.

- Front End, we use NetBeans to implement our website.
- Back End, we need Database (sql).
- Programming languages, The programming language used is HTML including CSS, JavaScript, and PHP.
- Lessons and Options, The curriculum is based on the textual, graphics, and written method of presenting the various features. It contains the C ++ language code and consists of three levels. It is may find difficult to determine the level of the child the method of education depends on practice and challenges making it also one of the best choices.
- Video tutorial, Video tutorial to teach the programming language C ++ and how to pass the quizzes and challenges.
  - Design, Adobe Photoshop, and HTML for the interfaces.

3.1.2 Use Case

This diagram explains all the features and functionality that the website will provide to users. It is a list of actions typically used to determine interactions and actions that the system can perform. such as the children who will use the website represent the users and the use case represent the functions on our website. After accessing the home page, the user can create a new account and log in, log out to their accounts, reset the password and access the tutorial page or skills page to know more about the C ++ programming language. Also, they can take or view books that we downloaded in the website, then perform quizzes or challenges that can show the level result. After they finish the first three levels successfully they can take a certificate. The following formats illustrate the use case form for the Teaching Programming to Kids website.
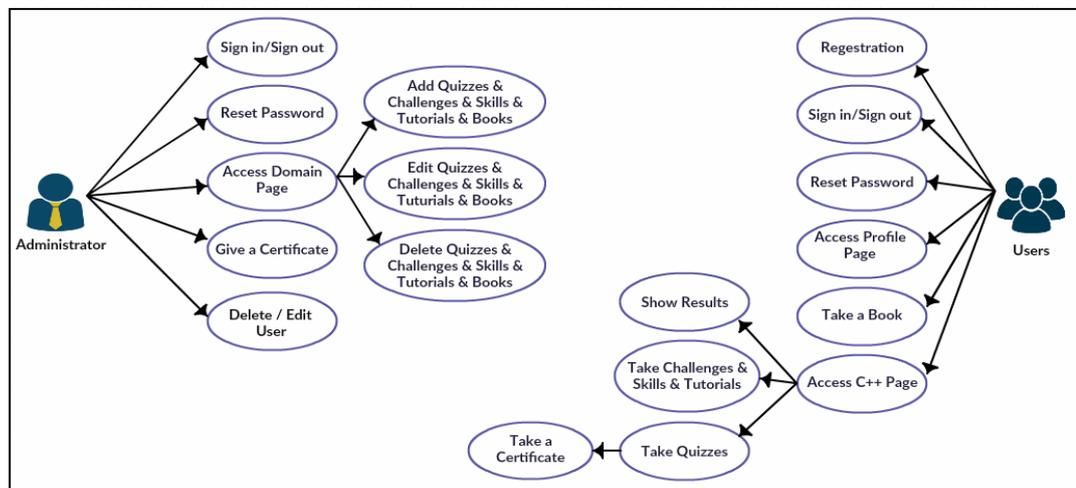

Figure 1: Use Case Diagram

3.2 SYSTEM and SOFTWARE

We have designed different types of Unified Modeling Language (UML) diagrams that are the most useful for system modeling and we relied on the use case that we have designed [Figure 2]. Also, we have designed a diagram that describes the process of a system. It is about representing a system using some kind of the system interfaces designing, we design our website with Html, CSS, and JavaScript programming languages that we have linked with the actual system database, which will increase the productivity and effectiveness of the system and the ability to develop it in the future.
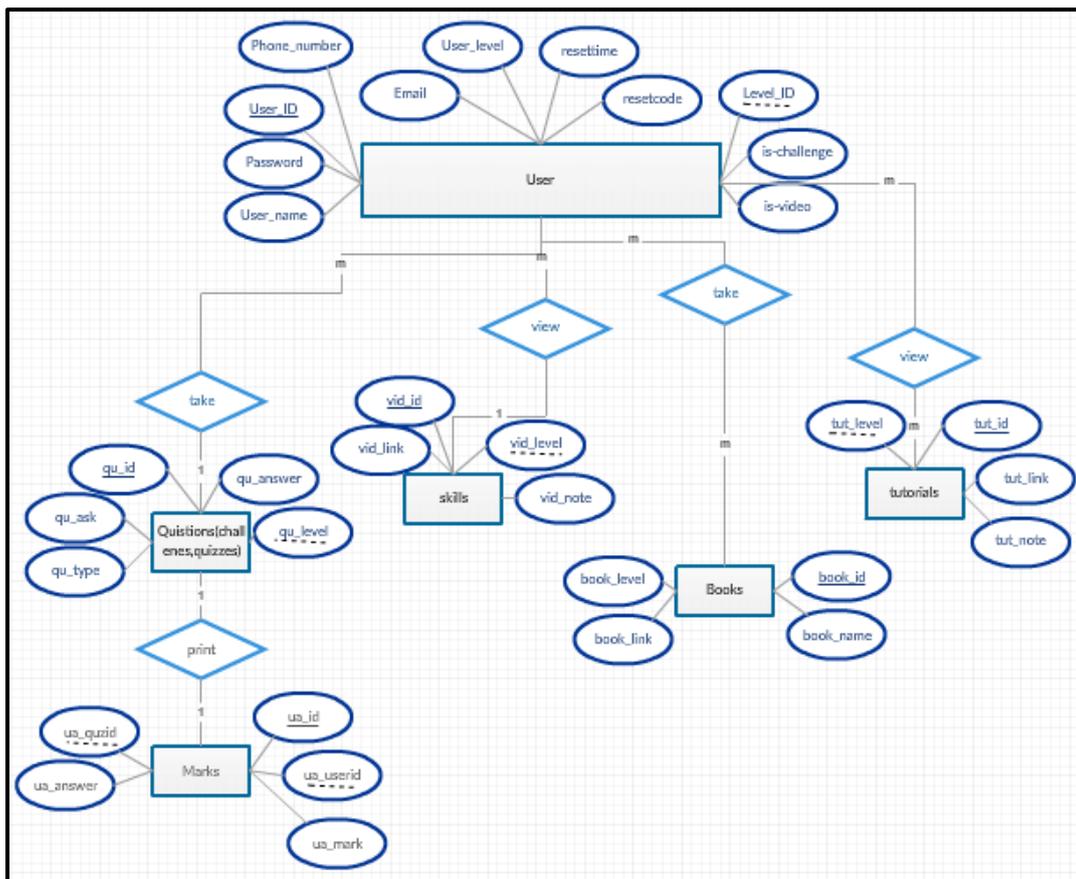

Figure 2: ER Diagram

3.3 IMPLEMENTATION and UNIT TESTING

In this way, we should partially test each component of the system [look at figure 5] in terms of work and how to implement when linked to the MySQL database and the possibility of the browser to define the website, and then we should test the system completely in the future when users access the website and used its units and communicate with the system administrator.
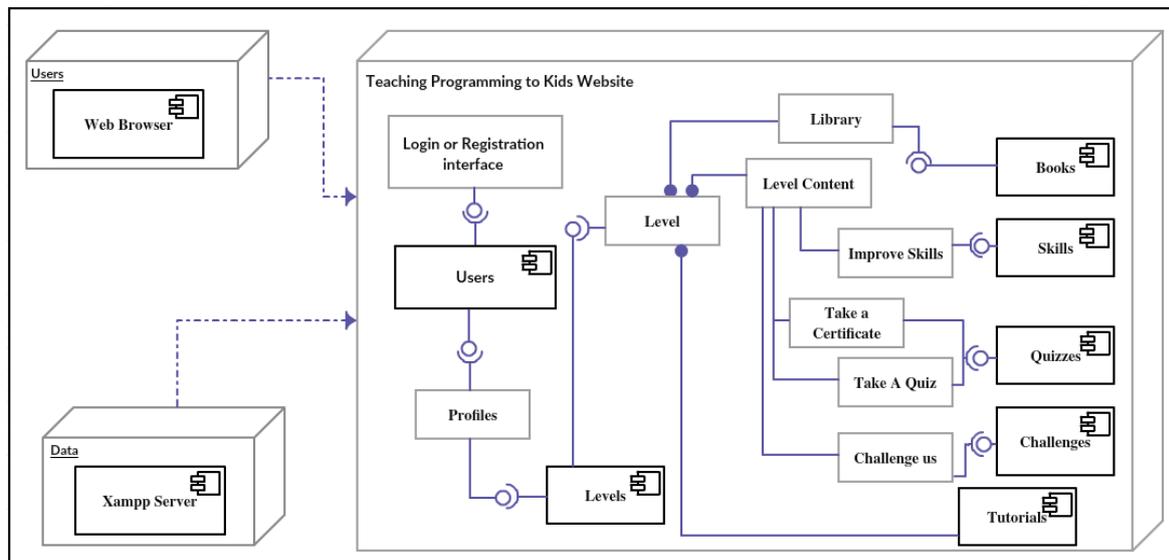

Figure 3: The Component Diagram

3.4 INTEGRATION and SYSTEM TESTING

After we have tested each unit of the system [Figure 5] the testing method that used is to performed to expose defects in the interfaces and interaction between integrated components. It tests the interactions between software components and it is a technique of testing the lowest or the smallest unit of any application or system to detect the errors. As an example of a tested function in figures 6 and 7.

3.5 OPERATION and MAINTENANCE

It is a process that should be developed to solve difficult system problems in large-scale, there are three steps we should follow to solve when we test the entire system:

1. Identify the problem.

2. Choose or develop a suitable process for solving this type of problem.

3. Execute the process.

We will work to deploy the system and verify the completeness of the objectives that we pointed it. Then we going to develop the system and the website to become a documented educational site in the future.

By solving these problems from the beginning when it's discovered, the maintenance will be periodically and will help in the continued operation of the systems.

4. RESULT AND DISCUSSION

This project was chosen because of the importance of programming in our time, and it would be better to the children start learning from childhood because this will give them a good background for this language and how it works, then in the future they can improve and develop this skill. "You know programming is more important than learning English as a second language," said Tim Cook, Apple's chief executive officer. Programming has become involved in all areas, and it is necessary to encourage our children to learn. We have faced difficulties such as data collection that help us to create basic concepts of programming languages such as the various questions that will be put on the site and create a database to

display the results of those questions and storage grades. Also, to choose and create a web interface with designs that attract children so that they can navigate between pages, the available technique that have helped us to gather project requirements is the questionnaire method for data collection, analysis, collection of requirements, the information and tools that should be contained in the site that was a set of related questions. Which it helps us to know the specific things that children and parents want in the website, they all agree on some points first, the website language should be in English. Second, should contain tutorials and skills that children should watch it before they take a quiz. Third, the interfaces should be in an interactive way to attract them.

5. CONCLUSION

Because programming instruction is well influenced by the needs of the community in the near future and because digital techniques can play a transformative role in education. Teaching children the programming languages is the best way to develop and improve their skills. In this paper, we discussed some of the points that helped us to implement our website. We started with a brief summary of the main problem of the research topic and then the way to solve this problem followed with the introduced an introduction to the history of programming, then we talked about the methods and what method we have used, then we talked about the main services and the main interfaces of the website, also we mentioned some previous studies to teach children programming and finally the method of discussion used in the research.

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