

A High-School Homeschooling Education Model Based on Cloud Computing

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Abstract. This paper aims at developing a conceptual model for homeschooling education at a high-school level by using cloud computing technologies. Specifically, a data flow model was developed to show how cloud computing can be adopted in home-schooling education. Then, a set of usability solution items were derived based on breaking down each flow in the data flow model. The findings from this paper will be helpful to system developers and education system decision makers when making decisions on homeschooling systems development.

Keywords: homeschooling, cloud computing, education.

1 Introduction

Homeschooling is an approach to education that has been taking place for generations. Robert Kunzman mentioned that the homeschoolers is more than two million in the United States (2012). More children are being taught at home now than ever before. States and parents have been at odds about insuring "quality of education" and parents' rights to supply that education themselves. While some states require strict control and monitoring that require parents to report the progress of the student others don't require reporting to the state. (Sparks, 2012) Questionable school ratings, poor funding, and safety issues have made homeschooling more appealing.

Colleges today have made concessions from the traditional entrance requirement, recognizing that homeschooled students may not have traditional transcripts and entrance exams scores. (Callahan, Callahan. 2004) While these concessions help, homeschooled students still face disadvantages when applying to many universities. Hence, a well-designed education service system is required to fill in the gap between public education and homeschooling education without the encumbrance of undesired regulatory intervention. In this paper, we offer a cloud-computing based bridge that allows

parents to educate their children at home and be assured that future opportunities will be available to the student.

Literature review on cloud computing showed that the cloud computing technology has been widely to assist decision making via a cloud computing environment (Brynjolfsson, Hofmann & Jordan, 2010; Miller and Veiga, 2009; Peng, Zhang, Lei, Zhang, Zhang, & Li, 2009). Cloud Computing is one of those pieces of technology that is useful to almost everyone, but the implementation of it in schools depends on the grade level, and the size of the school itself. With a majority of cloud computing being used for colleges more than high schools, the purpose of this paper is to bring cloud computing to the high school level homeschooling.

The format of this paper is organized as follows: Section 2 presented a conceptual data flow model for high-school homeschooling education. Section 3 derived a set of usability features based on the flows in the developed conceptual data flow model. Section 4 presented discussions and conclusions.

2 High-School Homeschooling Education Services Model

A high-school homeschooling education model is developed and illustrated in Figure 1. This model is developed by using the data flow diagramming. A cloud computing based system stores the information of all courses. To support the courses, we will be utilizing the services of teachers to create learning videos on a variety of subjects. Once that is complete, a simple form will be made to allow for new students and let the guardians pick the proper method to teach them. The scope of the system will be purely for high school levels (9-12), with material that can be used to prepare for college. After the completion of the 12th grade the customer/student, he or she will be adequately prepared for college and have a high school diploma (through being home schooled) but be no different. With the implementation of this system, the guardians of the kids using our system will have complete control of how they teach without outside intervention.

In Figure 1, the primary components of the model consist of an internet connected device for the user to access the system; a Registration process, which creates a Login account as well as a financial transaction. The Manage Financials procedure produces the customer receipt and handles internal and external financial processing, including Bank and Teacher Payment; while the Login process records usernames, passwords, and a course list in the Login Data Store and allows access to the courses the student is enrolled in. The Courses Data Store is a compiled list of all the courses offered. To create the courses, we begin with state certified Teachers that are selected by Advantage Education Services to deliver the course criteria and record lecture videos to complement the written course

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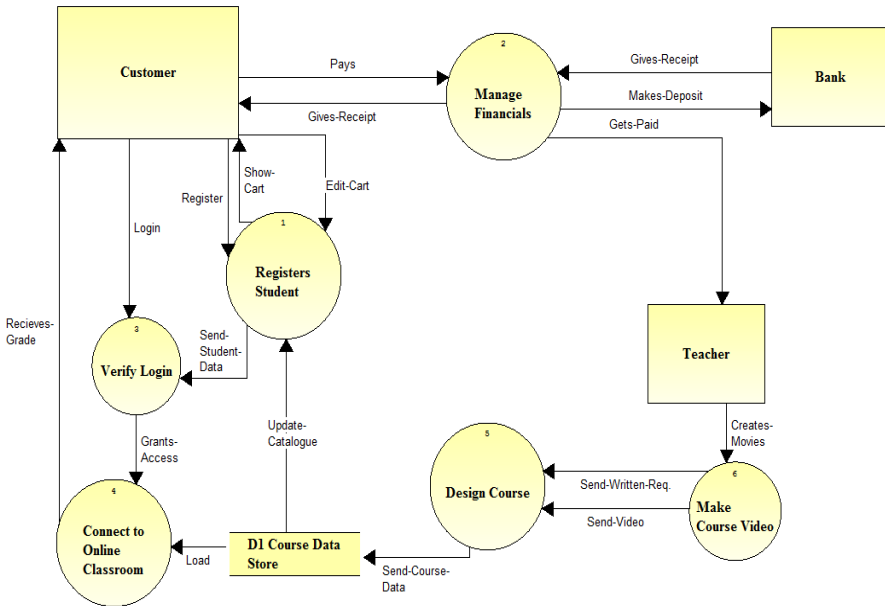


Fig. 1. High-School Homeschooling Education Services Model

material. The components "Create Videos" and "Compile Course" will file the courses in the Course Data Store. Once the student begins a class, periodic Grades are sent to the account administrator.

3 Features in High-School Homeschooling Education Services

Based on the top-down system analysis approach, a set of features were further decomposition based on flows in Figure 1. The produced set of features is presented in Table 1.

These developed features in Table 1 were given to experts for validation. Based on the comments from these experts, Table 1 was modified. A final validated table was constructed based on feedbacks from experts.

Based on the features developed in Table 1, a prototype system was developed. In the system analysis phase, the process modeling such data flow diagrams were used to construct users' required features in Table 1. This prototype system was constructed by using the Visual Basic.net for menu driven user interfaces and Microsoft Access for database management.

Table 1. Decompositions of information flows

| Information Flow | Feature |
|--|--|
| Customer Payment | Guaranteed the student placement in courses. Chose a variety of payment options. Customer input Name/Address/Number of Children. |
| Customer Invoice | Customer gave a receipt of registration. Received payment (mail or e-mail). |
| Shopping Cart Alterations | Customers put classes in shopping cart. Removed classes. Payment checkout confirmation. Class selection confirmed. |
| Viewing Shopping Cart | Class selection viewed. |
| Customer/Guardian/Student Registration | Customer/Guardian ID number created. Gave an account. Gave a Student ID number. Input registration information. Received e-mail and text message confirmation for new account. |
| Customer Login | Customer login to the system. |
| Student Graded Material | Real-time entry of data. |
| Catalogue Update | Input of Course ID number. Course description. Course material needed. Course requirements. |
| Registered Student Data | Allowed access to cloud course site. Given access to attend and participate in classes. |
| Customer is Granted Access to the Online Classes | Used to have the student input homework assignments and view class materials. |
| Bank Gives a Receipt for the Deposited Money | Real time receipt of amount of money in bank account. |
| Bank Collects Deposited Money | Money deposited is secure. Money available for withdrawal. |
| Teacher Receives Payment | Gave a portion of the customer payment to teacher for services provided. |
| Video/Movie is Created | Allowed for student view. Used for educating on a certain topic. Created based on school and state requirements. |
| Written Course Requirements | Used to make sure the video is up to par. Used to make sure the customer believes the courses will educate the student. |
| Completed Video Sent | Real time entry. |
| Send Course Data | Real time entry. |
| Loading Courses | Selected course moved from Data Store to Online account. Allowed the customer to view the selected class list (chosen by the customer). |

4 Database Design Using Microsoft Access

Microsoft Access was used to analyze the entities and relationships among these entities. The Entity-Relation (ER) diagrams were developed in Figure 2. Then, a set of relations were mapped in the design phase and database was implemented in Visual Basic.net. The sample tables included are Class, Course, Guardian, Grade, Login, Semester, Student, Video, and Written Material. The Guardian and Student tables contain the personal information about both the guardian and the student. The Login table allows the Guardian access to the grades and class registration, the Login table also allows the student access to the course work. There are three forms titled: Guardian, Login and Student which allows new customers to be input into the system. One report is in the database named, Guardian Login Report, which gives you a list of the guardians with their usernames and passwords.

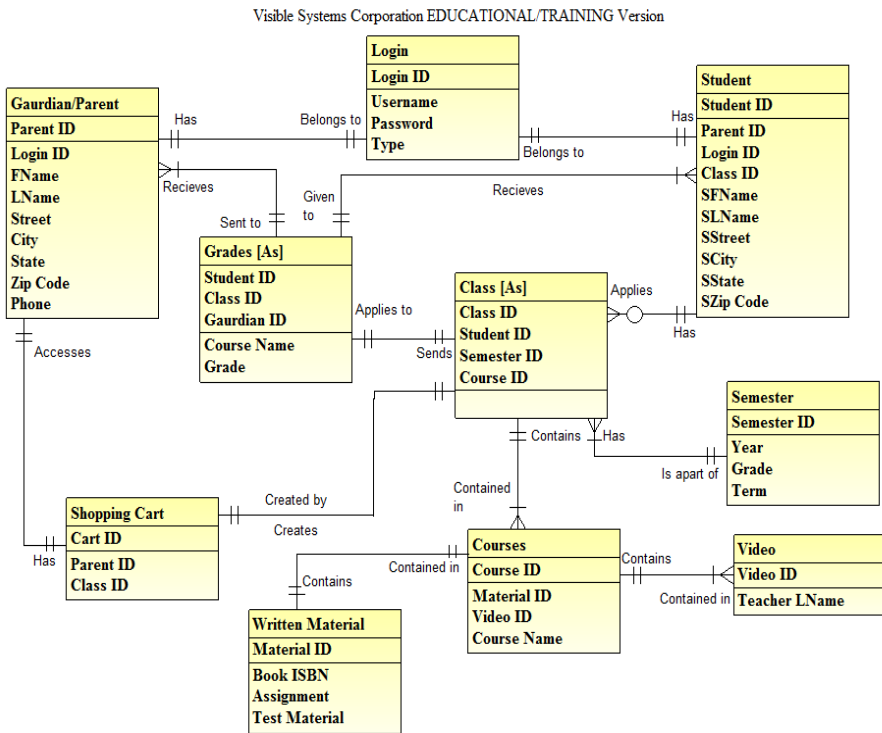


Fig. 2. Entity Relation Diagram for High-School Homeschooling Model

5 Conclusions

This paper developed a high-school homeschooling model for educational services based on cloud computing technologies. Specifically, it first presented a conceptual

model based on data flow diagramming. Then, a set of usability features for educational services for high-school homeschooling were derived based on the developed model. Finally, a prototyping system was developed based on this set of features.

The major findings from this study are: First, this study builds the gap by utilizing cloud computing technologies so that high-school homeschooling students can access and receive high-level education services anytime and anywhere. Second, the set of features developed in this study can help to develop high-tech homeschooling education systems.

The future study involves the system evaluation including usability testing. Moreover, the factors impacting on users' adoption of the homeschooling systems will be studied.

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