Data Processing in Xlet Application for Test of English as a Foreign Language Preparation on Interactive Digital Television

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Abstract: This study described Xlet applications for TOEFL preparation test Xlet applications are Java applets that were developed for the IDTV environment. With the digital television, t-Learning arises as an opportunity to facilitate learning for a large number of people spread all over the country who arenot covered by traditional e-Learning. This study starts with a study of the technologies involved in the development of such systems as well as an analysis of the necessary elements for proper use of DTV educational applications and the importance of this new media in TOEFL preparation test. The main objectives of this research to present the necessary elements to develop interactive TOEFL preparation test for digital television. Researcher have focused on methodologies to use digital television as an efficient medium to convey timely and useful TOEFL preparation test to the public, one of the purpose of using streamed media API is to present broadcasting content (e.g., audio material of listening) on digital television screen.

Key words: TOEFL preparation test, Xlet applications, digital television, analysis, elements, API

INTRODUCTION

Interactive digital television is a new vehicle of communication that presents significant possibilities for the development of educative related applications. Aarreniemi-Jokipel identified other reasons supporting the use of digital TV for learning purposes and argued that learning is an activity that should be time and place independent and digital TV supports this class of e-Learning (Paivi, 2006). In addition, digital TV has greater advantage compared to analogue broadcasting, since, it has two-ways and feedback features.

t-Learning is closely related with interactive access to video learning materials within home or other locations like school, workplace or community learning center, through a TV or adevice more like a TV than a personal computer.

Bates has identified a big potential for the use of iTV to increase learning opportunities at home in particular through personalized options and also the need to find ways of utilizing powerful combination of broadcast TV and interactive services to provide hooks to draw viewers into active learning environment.

Other researchers have shown that user friendly is one of the most important factor for digital TV (Choi *et al.*, 2003; Freeman and Lessiter, 2003; Dijk and Vos, 2001; Kang, 2002). Damasio identified the potential ofdigital TV to provide motivating, engaging and effective media for everyone whether the study takes place at school, at home or elsewhere (Damasio *et al.*, 2004). Gordon pull data source of streamed media API was created and controlled in Multimedia Home Platform (MHP) application with a media locator (Rob and Talley, 1999). Suhartono explained method of processing data in multimedia home platform applications for earthquake early warning of potentially tsunami services (Ali, 2014).

MATERIALS AND METHODS

Experiment data: The research was conducted at the Computer Networks Laboratory, Department of Informatics Engineering, State Islamic University of Maulana Malik Ibrahim Malang, East Java, Indonesia. The data for the study were taken from TOEFL preparation test database in XML format.

XML format from TOEFL preparation test in web site contains questions and answers that can be accessed in real time. The question data and answer for TOEFL preparation test are obtained using GetRSS application that updates question data and answer data from TOEFL preparation test in web site. The data are obtained through XML parsing from TOEFL preparation test in website. The research design is available in Fig. 1, application of TOEFL preparation test in web is connected to the Internet via XML, STB (MHP) on digital television is connected to the internet via. IPTV network.

The hardware used in this study includes a laptop with specs Processor Intel (R) Pentium (R) Dual CPU T 2390@1.86 GHz (2 CPUs) and Memory 1014 MB RAM, screen monitor with a resolution of 1024×768. The software used in this study includes Netbeans IDE 7.0, the programming language Java application, the Java Runtime Environment (JRE), the package environment for Java applications and XletTView, the environment for the application package MHP (Multimedia Home Platform) and OpenCable Application Platform (OCAP) for Xlets run.

DVB-J application (Xlet): DVB-J application running on DVB-J platform is a standard Java Virtual Machine (JVM) and a set of the Application Programming Interface (API). DVB-J application is designed in a special GUI for TV, so that, DVB-J application provides an opportunity for application developers (Damasio *et al.*, 2004). The Xlet states are loaded, paused, started and destroye (Morris and Anthony, 2005). The complete lifecycle of an Xlet is depicted in Fig. 1.

The application manager loadsinstance of the Xlet's main class file and creates an instance Xlet by calling the default constructor. Once this has happened, the Xlet is in the loaded state. When the user chooses to start the Xlet (or the AIT indicates that the Xlet should start automatically), the application manager calls the initXlet() method, enabling the Xlet to initialize itself, possibly loading any additional data from the object carousel. When the initialization is complete, the Xlet is in the paused state and is ready to start its execution. When the application manager calls the start Xlet() method, the Xlet is moved into the started state and is now able to interact with the user (if it is programmed to do so). During the execution of the Xlet, the application manager may call the pauseXlet() and startXlet() methods several times, moving the application to paused state and started state, respectively. At the end of the Xlet's life time, the application manager calls the destroyXlet() method which causes the Xlet to go to destroyed state, freeing all its resources. After this point, this instance of the Xlet can no longer be started.

Test of English as Foreign Language (TOEFL): Test of English as a Foreign Language (TOEFL) is a standardized test of English language proficiency for non-native English language speakers. The test is accepted by many English-speaking academic and professional institutions. TOEFL is one of the two major English-language tests in the world, the other being the International English Language Testing System
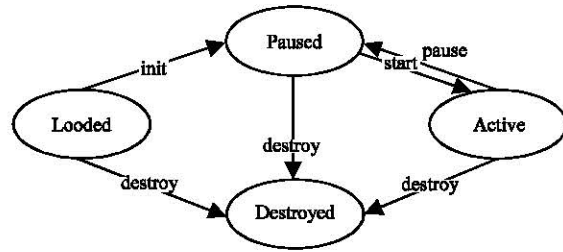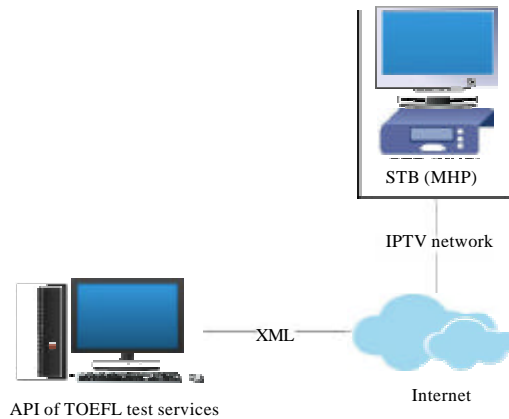

Fig. 1: Xlet lifecycle

Fig. 2: Home network based on MHP TOEFL preparation test in web and XML

(IELTS). TOEFL preparation test format in research is Paper-Based Tests (PBT). TOEFL preparation test includes three sections (Fig. 2).

The sections are listening, structure and reading. The listening section consists of 3 parts. The first part contains 30 questions about short conversations. The second part has 8 questions about longer conversations. The last part asks 12 questions about lectures or talks. The structure section has 15 questions of completing sentences correctly and 25 questions of identifying errors. The reading comprehension section has 50 questions of reading passages. The final TOEFL preparation test score ranges between 310 and 677 and is based on three sub scores: listening 31-68, structure 3-68 and reading 31-67.

RESULTS AND DISCUSSION

Data of education English for TOEFL preparation test based API WEB. Data processing method for TOEFL preparation test is data processing method from server-side web API of TOEFL preparation test in XML format. XML file contains data of TOEFL preparation test. The name of XML file is toefl.xml. Source code of toefl.xml can be seen in Algorithm 1. The data consist question data and answer data. The diagram of TOEFL preparation test application can be seen in Fig. 3.
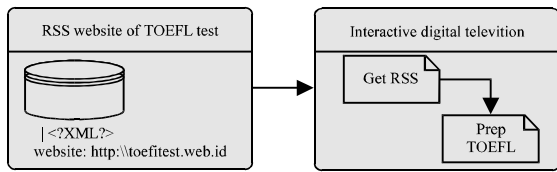
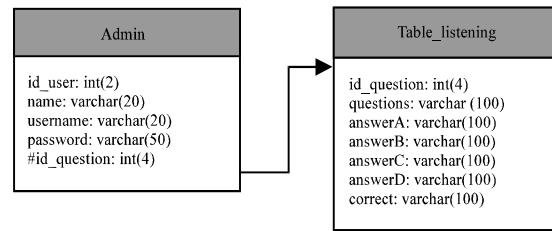Fig. 3: The research diagram of TOEFL preparation test application

Fig. 4: The web site of TOEFL preparation test

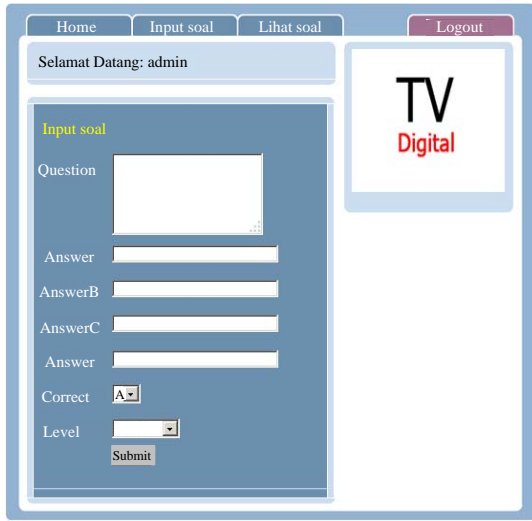**Algorithm 1; Source code of TOEFL.XML:**
```
<?xml version = "1.0" encoding = "iso-8859-1"?><data><record>
<title>Xml data exam online tv</title>
<id_soal>1</id_soal>
<question>The cyclist_____hecrossed the main street</question>
<answerA>Looked with caution after.</answerA>
<answerB>Had looked cautiously before.</answerB>
<answerC>Was looked cautions when.</answerC>
<answerD>looks cautious when</answerD>
<correct>B</correct></record><record>
<id_soal>2</id_soal>
<question>Here,_____notebook and report that I promised you last week</question>
<answerA>Is the.</answerA>
<answerB>Are the.</answerB>
<answerC>Was the.</answerC>
<answerD>Has been a.</answerD>
<correct>B</correct></record>
</data>
```

The development of TOEFL preparation test application is divided into three phases. The first phase is to build a web site of TOEFL preparation test. The web site of TOEFL preparation test created with PHP in Fig. 4.

Database of TOEFL preparation test was created using PhpMyAdmin. Database structure can be seen. As shown in the Fig. 5, there are two main tables in the database of TOEFL preparation test application, table

Fig. 5: Database structure of TOEFL preparation test application

admin and table listening. Each table has a number of entities and both tables are connected. Table admin contains user data and table listening contains data about the questions.

The second phase is to build GetRSS application. The application gets question data and answer data from toefl.xml through internet connection. GetRSS application is application based java to get data from server-side web API of TOEFL preparation test with URL: http://localhost/admin/toefl.xml. The question data and answer data save in application with format file "question.properties". Source code of GetRSS application can see in Algorithm 2.

Algorithm 2; Java language source code of GetRSS application:
```
public void GetXML() {
try {loadData()
DocumentBuilder builder = DocumentBuilder Factory. newInstance(). new DocumentBuilder()
URL u = new URL("http://localhost/admin/toefl.xml") Document doc = builder.parse(u.openStream())
NodeList nodes = doc.getElementsByTagName("record")
intjml_data_baru = 0
intjml_data_lama = Integer.parseInt(proper.getProperty("Questions"))
for (inti = 0; i<nodes.getLength(); i++) {
Element element = (Element) nodes.item(i)
proper.setProperty("Q"+i+".question"
getElementValue(element, "question"))
proper.setProperty("Q"+i+".answerA"
getElementValue(element, "answerA"))
proper.setProperty("Q"+i+".answerB"
getElementValue(element, "answerB"))
proper.setProperty("Q"+i+".answerC"
getElementValue(element, "answerC"))
proper.setProperty("Q"+i+".answerD"
getElementValue(element, "answer"))
proper.setProperty("Q"+i+".correct"
getElementValue(element, "correct"))
jml_data_baru++;}//for
proper.setProperty("Questions" String.valueOf(jml_data_baru))
for (inti = jml_data_baru; i<jml_data_lama; i++) {
proper.remove("Q"+i+"".questionz")
proper.remove("Q" +i+ ".answerA")
proper.remove("Q" +i+ ".answerB")
proper.remove("Q" +i+ ".answerC")
proper.remove("Q" +i+ ".answerD")
proper.remove("Q" +i+ ".correct");}
proper.store(new FileOutputStream(directory+"src/question.properties") null)
System.out.println("Update of Queastions")}//try
catch (Exception ex) { ex.printStackTrace()}}
```
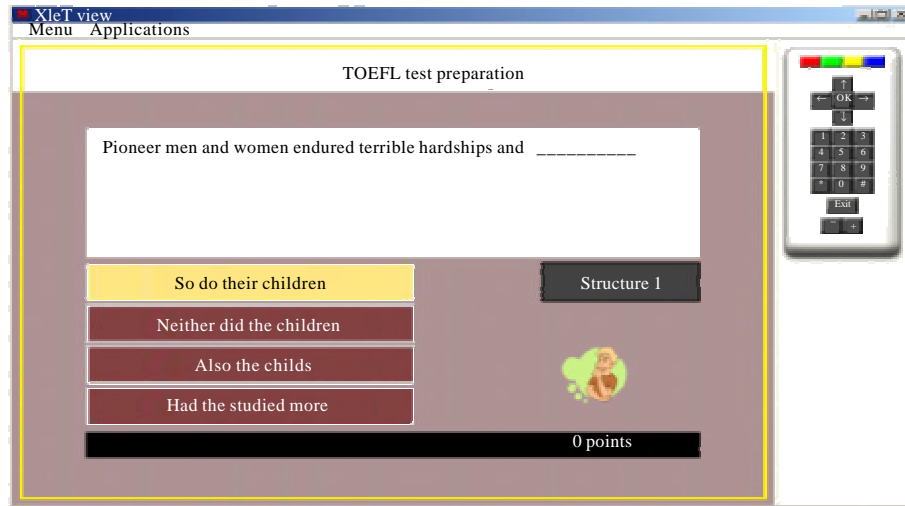
Fig. 6: TOEFL preparation test application based interactive digital television

An audio material of listening for user was created with a MediaLocator in Algorithm 3. The URL is a source pointing to a DVB service (e.g., audio).

Algorithm 3; Java language source code of medialocator:
MediaLocatormediaLocator = new MediaLocator (URL)
Player player = Manager.createPlayer (mediaLocator)

The third phase is to develop TOEFL preparation test application based interactive digital television. The TOEFL preparation test application based interactive digital television can be seen in Fig. 6. When user clicks on "OK" button in the middle of the remote-control device in order to execute choice. The "UP" button function is to shift choice to up. The application is closed by clicking on the "EXIT" button on the remote control. The application requires application analysis.The analysis describes activities in system, so, system can run in line with expectations.

The TOEFL preparation test application based interactive digital television was designed using use case, sequence, class and component diagrams offered by UML and rational rose tool.

Use case diagram: The use case diagram is a visualization of a use-case, i.e., the interaction between TOEFL preparation test applications based interactive digital television and users. Use case diagram in TOEFL preparation test application based interactive digital television consists three cases such as case of play of application of preparation TOEFL, case of help and case of exit. Figure 7 presents a simplified use cases diagram where the following cases can be seen).

Use case: Start TOEFL preparation test application.

Actor; The user: It represents the user to use TOEFL preparation test application that is all the TOEFL preparation test users.

Objective: To start TOEFL preparation test application the user must click start the system will present theoretical contents of the class and the questions automatically from pre-existing question list and the user will start to answer, visualizing the questions correction. After the end of the application of TOEFL preparation, the users can see the score and they can use a new application).

Use case
See help actor; User objective: The user has help options to get to know how TOEFL preparation test application works. They must use the remote control to interact with TOEFL preparation test application based interactive digital television).

Use case
See exit; Actor the user objective: The user exit from TOEFL preparation test application based interactive digital television.

Activity diagram: Another diagram specified in UML is the activity diagram, the activity diagram in TOEFL preparation test application based interactive digital television consist of activities, states and transitions between activities and states can be seen in Fig. 8.
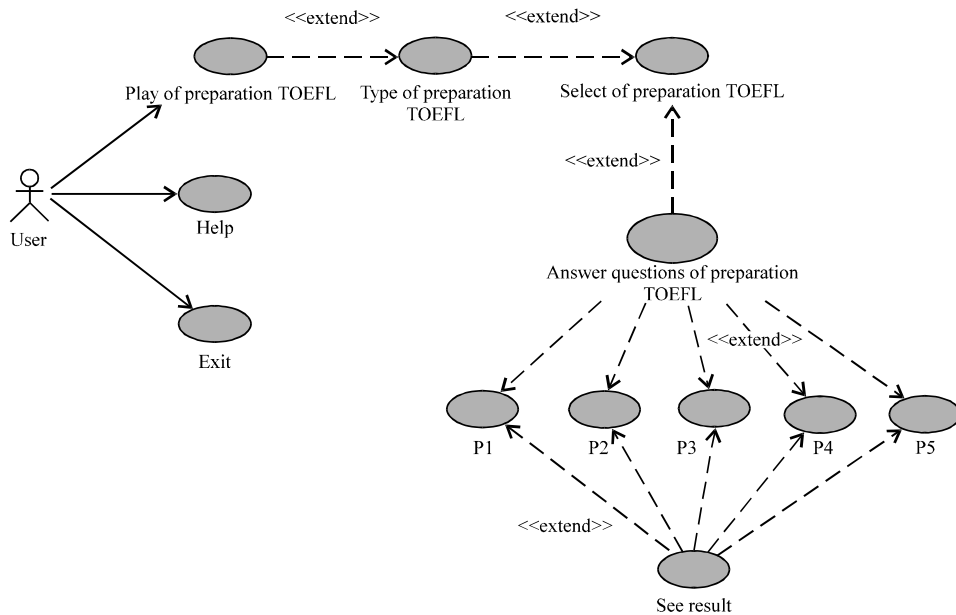
Fig. 7: Use case diagram of TOEFL preparation test application based interactive digital television
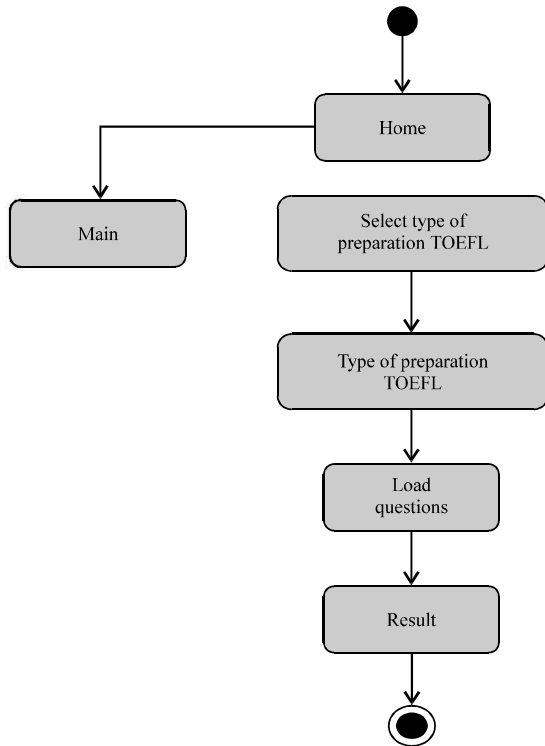

Fig. 8: Activity diagram of TOEFL preparation test application

Sequence diagram: Sequence diagrams describe interaction between objects and environment (user, display, etc.) in the form of message with respect to time. Sequence diagram in TOEFL preparation test application based interactive digital television consist seven squences diagram, first is sequence diagram of user, second is sequence diagram of home, third is sequence diagram page of type, fourth is sequence diagram of type, fifth is sequence diagram of question, sixth is sequence diagram of question and seventh is sequence diagram of score. Figure 9 presents a simplified sequence diagram of TOEFL preparation test application based interactive digital television.

Class diagram: The class diagram is the most important entity in object-oriented analysis and design. It describes the types of objects that exist in the system and shows static relationships among internal classes of system. The class diagram can be used to show attributes andoperations of a class and also the constraints that apply to the wayobjects are connected. Class diagram of TOEFL preparation test application based interactive digital television consists seven classes, class TOEFL, class information as page of information application, class menu as page of mainapplication, select type class functions as page of type of TOEFL preparation, class type as page of type of TOEFL preparation test, class questions page as page of question of TOEFL preparation test and class Score as page of result. Figure 10 presents a simplified class diagram of TOEFL preparation test application based interactive digital television.
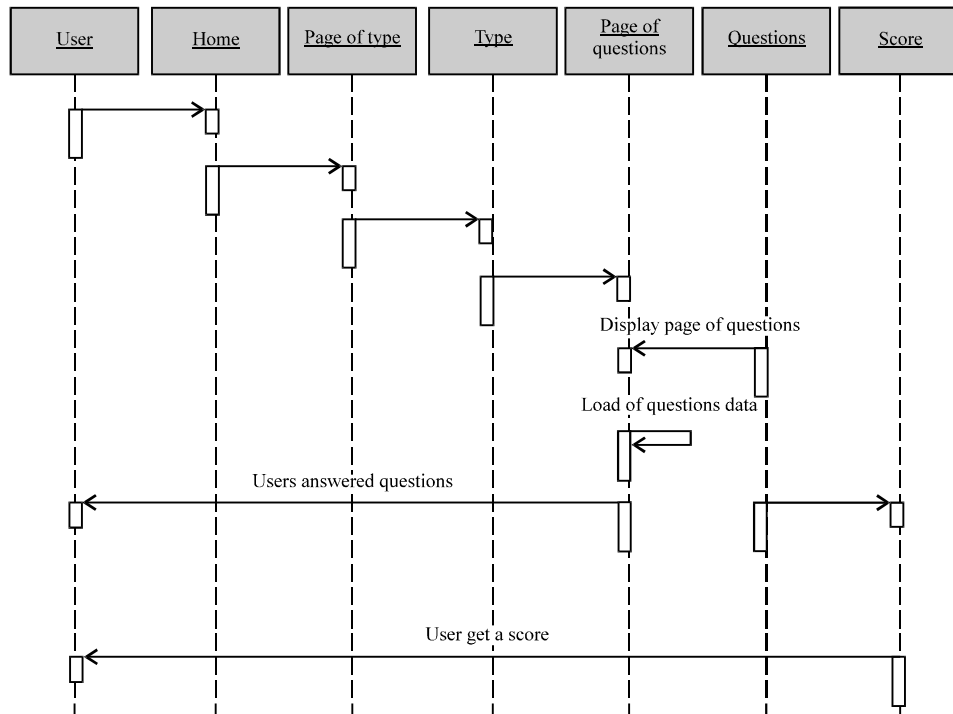
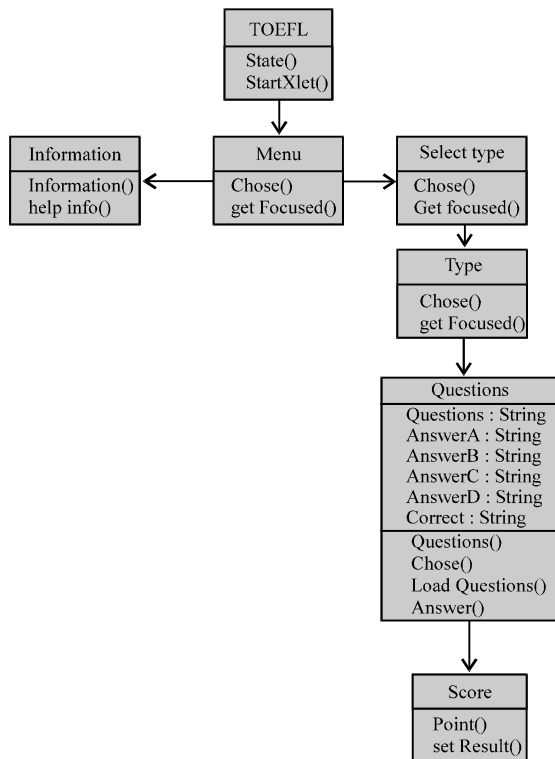Fig. 9: Sequence diagrams of TOEFL preparation test application

Fig. 10: Class diagram of TOEFL preparation test application

CONCLUSION

The main goal of the research is covered in this study. The goal is to find a way to learn about TOEFL preparation test such as listening, structure and reading in a timely and efficient way. My approach for achieving this goal is structured on the prototyping of Xlet based interactive applications. In order to realize this goal, Researcher decided to emphasize on learning language for TOEFL preparation test in the IDTV environment. To receive and process live online data and sending interactive feedback through the return channels. Thanks to simple user interface based on the commands of remote-control device, these Xlet applications are quick to access and easy to learn English for TOEFL preparation test. The research subjects that are covered in this study will be useful with streamed media API to present broadcasting content audio material of listening on digital television screen.

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