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THE DISTANCE LEARNING PACKAGES ORGANISATION AND DISTRIBUTION PRINCIPLES

The development processes of instruction e-content (CAI, CAL) several crucial principles has to be considered both for a computer science environment and for methodology of teaching [3][4]. Interactivity belongs to these factors of characteristic features that provide the user with various measures allowing controlling the study progress and knowledge quality analysis of the application user. A specific distance - learning interfaces are implemented not only for educational resources development but also for special services of Internet databases distribution. They provide the users with monitoring facilities and measures indicating the user self-education level with his ability of working in Virtual University.

1. INTRODUCTION

The knowledge level has to be checked to certify the user qualification. To fulfil this goal several validation entities have to be available. The given interaction formats make possible to set an individual measure of the user interactions. Various validation formulas are available for the application developer.

Recent years the Internet technologies are used for various data distribution, among them for virtual university organization. Many educational units work with this new services development expecting to offer more effective and less expensive systems for the user self learning.

The distance learning (via Internet) model of education causes new challenges for study methodology and for methods of these application construction then distribution.

Bellow the recent works of the platform for the distance learning system applications development has been presented.

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2. THE MAMS & QRU CHARACTERISTICS

The e-learning processes are under control of the application management engine called Multimedia Applications Management Shell (MAMS) [2] that has been developed in University of Silesia, Computer Systems Department [1]. This shell allows selecting the needed application and its part. It is linking a main database with a workstation of the user where his interactivity record is produced. The application structure has been presented in Fig.1.
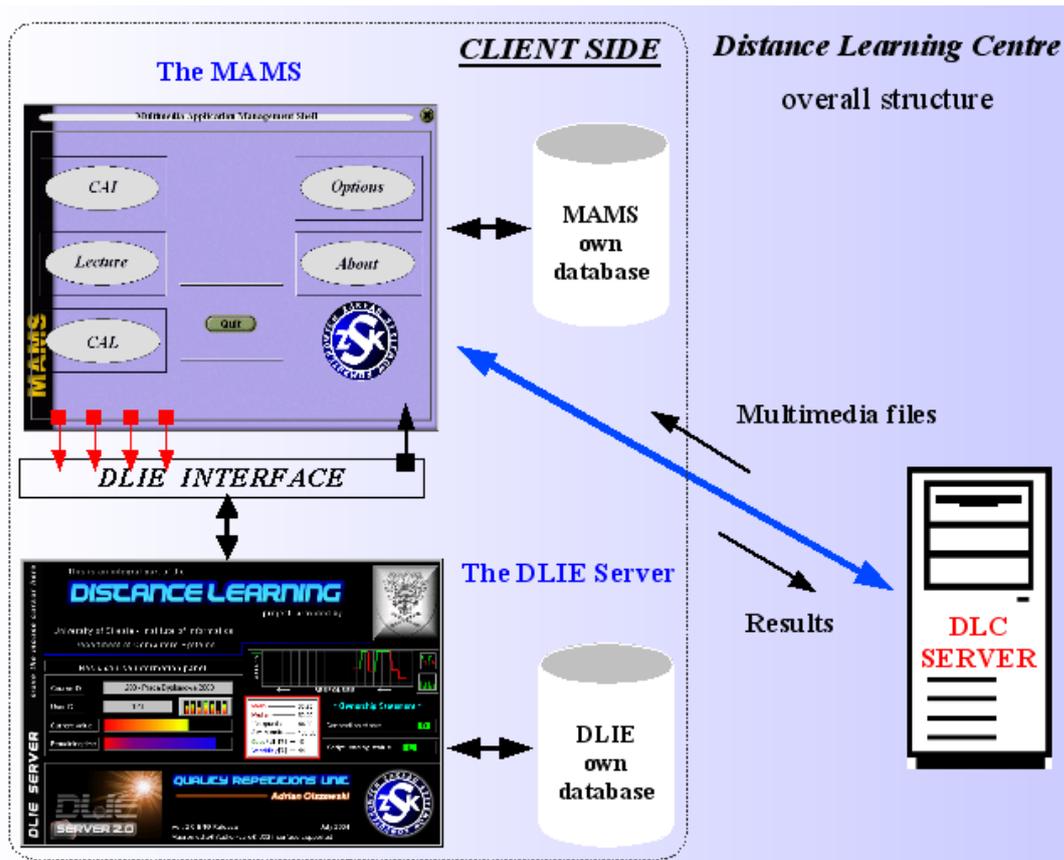

Fig. 1. The distance learning resources organisation

The Distance Learning System (DLS) user runs the application on his workstation then he sends back the result of interactions with the package content. The main database (on the main DLS server) collects his personal record as a proof of the user activity and knowledge level; as a Virtual University student.

This ability is obtained thanks to special structure of the application and services of the database distribution engine – under Quality Repetition Unit (QRU). The application structure consists of several levels of content that is switched under the interaction quality. Faults done during the default level of the application switch it into more complex level of the application. Similarly, satisfying results of the application will drug the application flow through shorter paths of the application. These mechanisms allow setting the application into the most convenient level and an order for the user.

The DLS database user interface has been shown in Fig. 2, where on the left-hand side of the screen the DLIE hot bar is visible. It provides the user with all available options. On a top part of the screen a flow of the application time is presented – for the answer or other activities. The main field of the interface shows three switches of the database, into:

- CAI (Computer Aided Instruction) mode – with a simple linear presentation of the content,
- Lecture mode – where all of the database content is available; without any restrictions for the lecturer,
- CAL (Computer Aided Learning) mode – with full interactivity of the application; under the QRU control of the application.

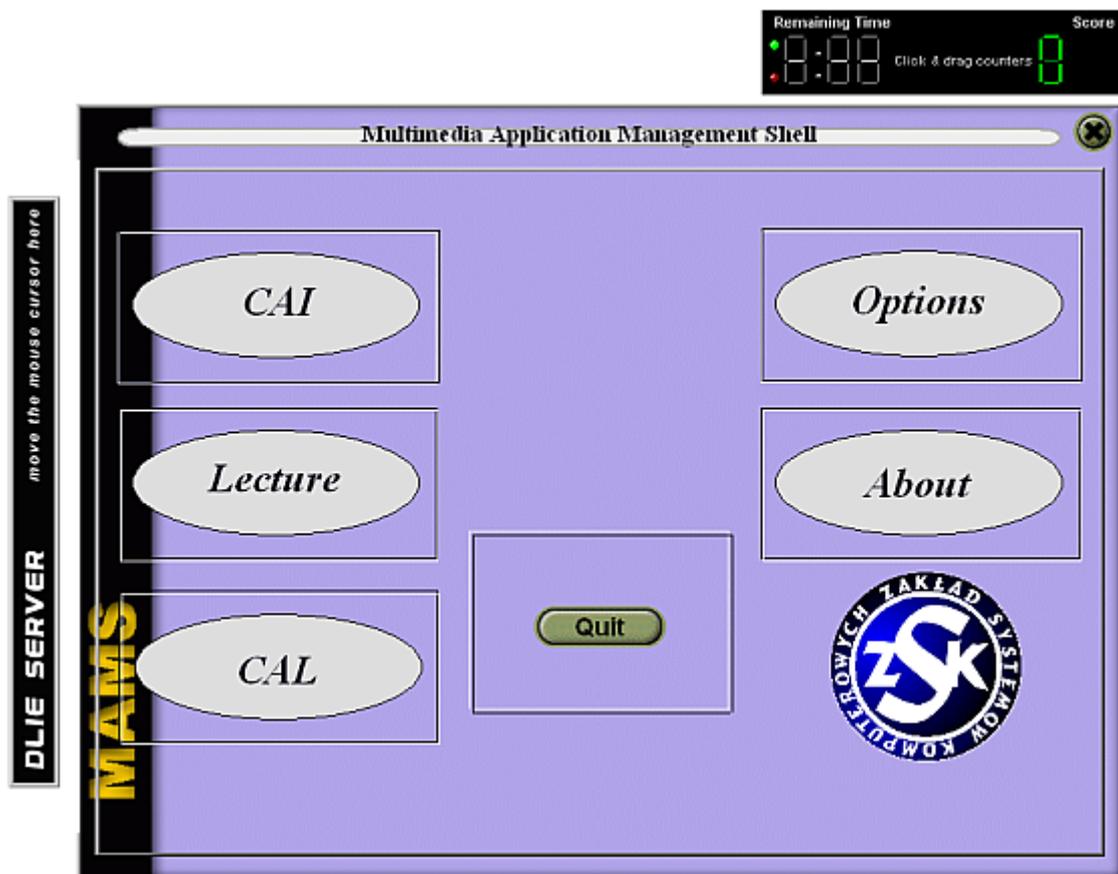The button Options provides the application with configuration settings.

Fig. 2. The application main window

The database contains teaching units (micro presentation units) with their identifiers, the user status, date and hour of the user actions, login into the system and others. The application is kept in the database in two parts. First runs under MAMS shell on the user workstation, with units containing presentation and question – frames. Every unit is mark by its unique identifier. The second part of the application is owned by DLIE Servers running for the server needs, with configuration of the application and its textual scripts.

The application script contains configuration directives, the lesson scenario (units' identifiers) and all responses template that define the DLIE Server actions. The script format

is driven by textual units bounded by simple grammar roles. The script provides the application with mechanisms of the decision-making unit, analyzing the user's action.

These mechanisms control a nonlinear presentation mode composition, with interactions and question frames within the application.

Majority of products offers a linear presentation mode only that goes through the application step by step and repetition of a whole unit – ordered in the same way.

The non-linear repetition mode controls the application through its small units ordered in various combinations; under conditional judgment of the application (Fig.3).
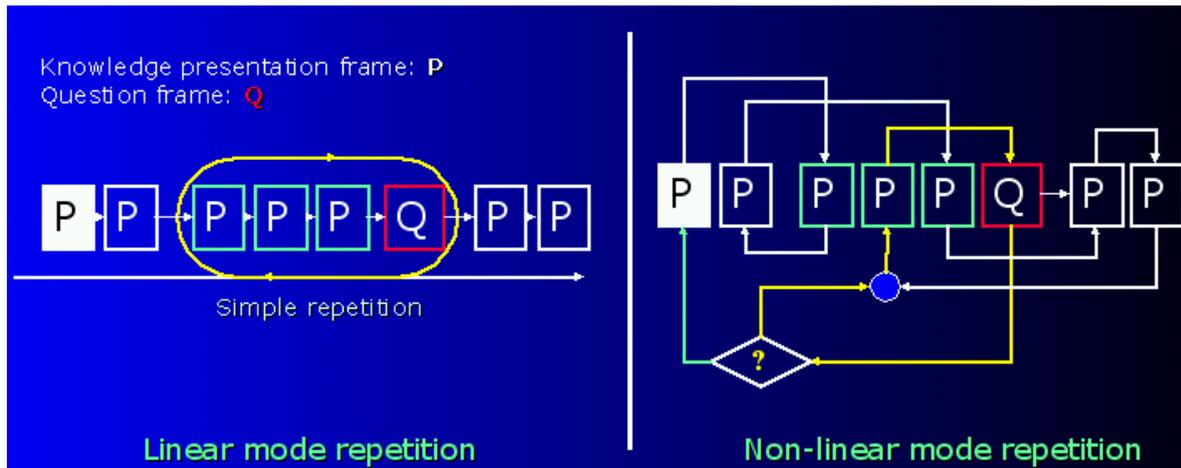

Fig. 3. The two repetition structures

The application starts from default settings of presentation, as a main path of the application execution. After every interaction is completed the QRU unit judges the interactions results, for controlling the application content presentation or repetition (nonelinear mode). Each course in the CAL mode is defined by its own script.

3. THE QRU CHARACTERISTICS

The DLIE Server uses the QRU (Quality Repetitions Unit) measures. They control the content study processes on a ground of interactions within the application units.

The QRU functions concern the following tasks:
- validation of interactions,
- controlling the application set up (for the repetition),
- calculating a total score of interaction results,
- transferring the results into the server.

The Fig.4 presents various functions of the DLIE Server with number of statistics and measures used for visualisation of the obtained results. The non-linear repetition mode controls the application through its small units ordered in easy graphical charts (stacked charts or histograms).
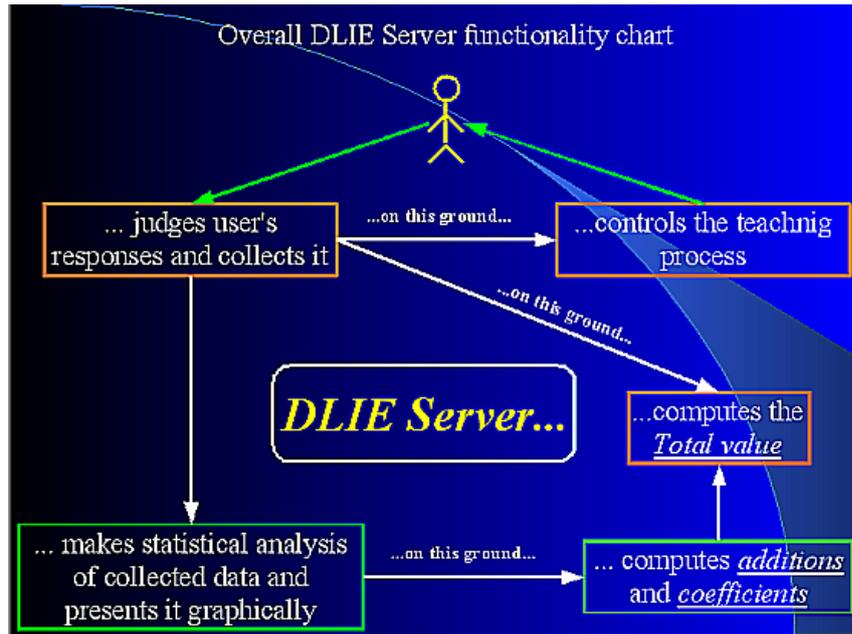
Fig. 4. The DLIE services flowchart

4. THE QUESTION FORMATS

Script formulas of questioning are usually put into hierarchical way, as it is shown in Fig. 5, where the level above contains next fields of the given questions. Each of the fields contains several variants of answers with its unique weights with the set of script identifiers, as: the script identifier (ID) and table of next question components.
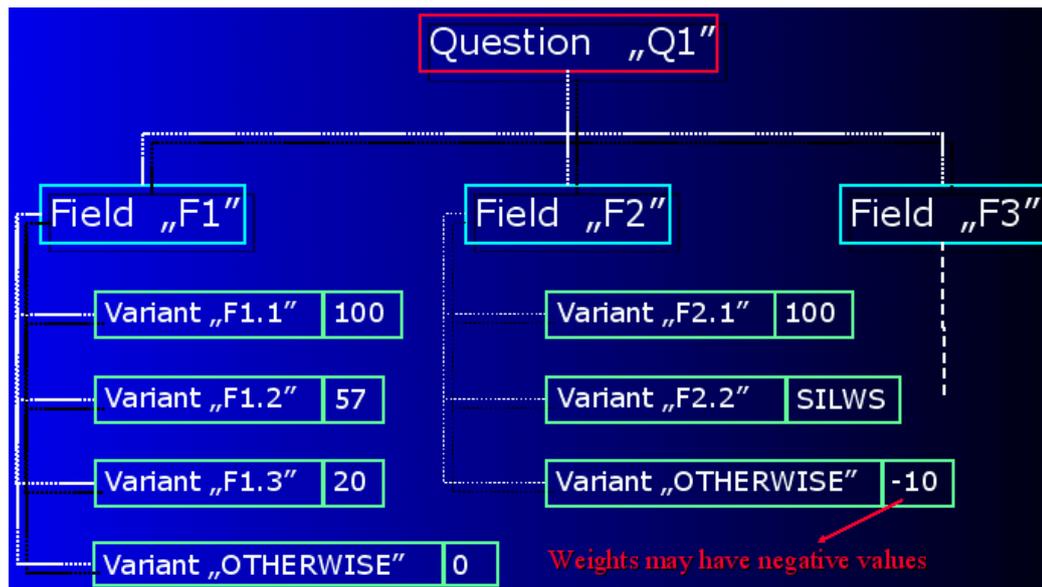

Fig. 5. The question structure

Each unique ID is linked with several possible answers, with its number and weight that allow for multi-valued analysis of the answers. The interactivity is analysed by the script given in a fill-up format of the user interactions. The judgement is given into the subsequent fields of the response protocol. An adequate record describes each part of the conversation and then every record is indicated by its unique identifier and local weight.

Instead of binary measures of the conversation (usually applied in applications) multi-valued measures have been provided. This way the DLIE server analyses the conversation factors combining the set of answers into one conclusion. Fig. 6 shows a main algorithm flowchart of interactions and answers validation.
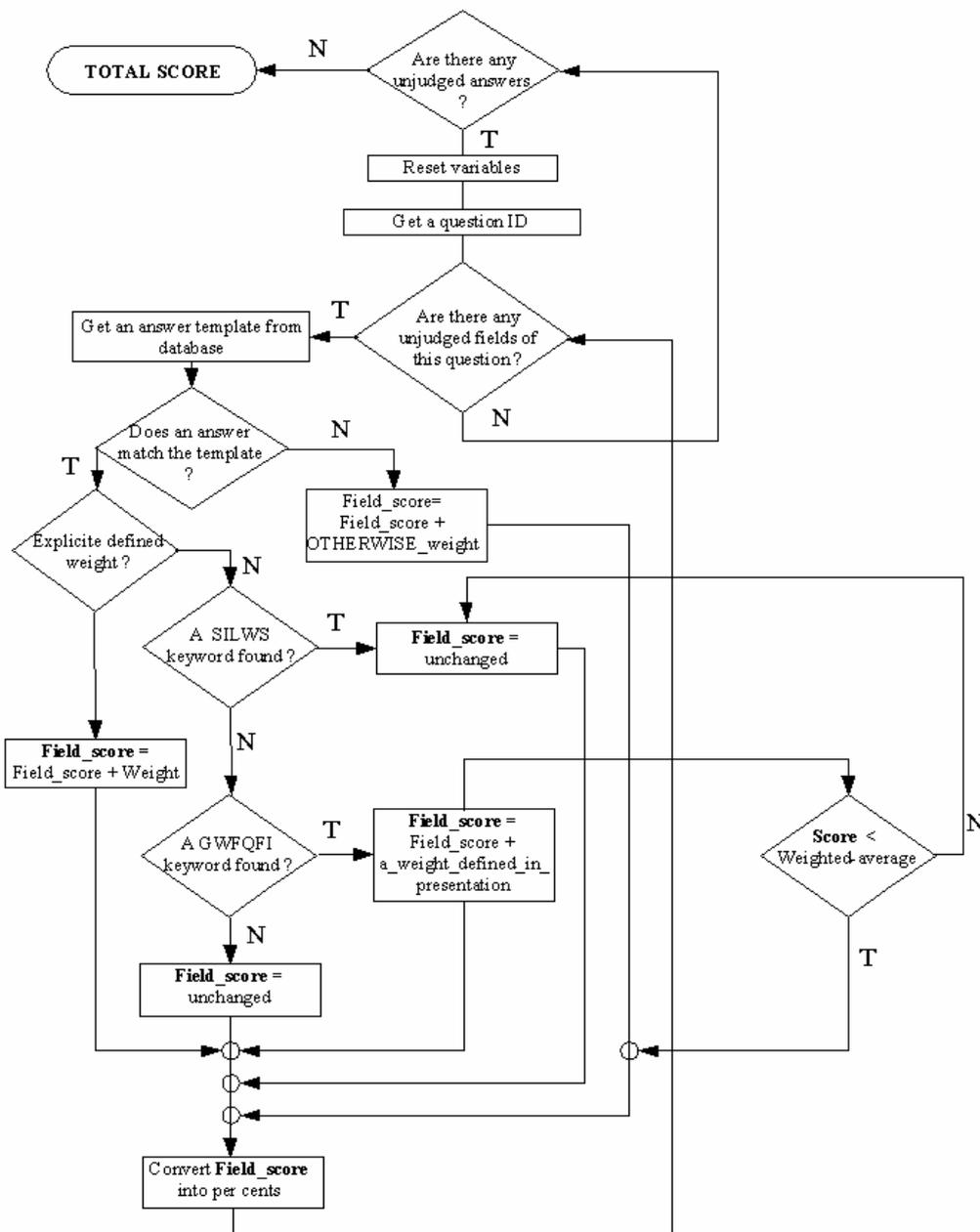

Fig. 6. The answers validation algorithm

The given questions format controls the interaction through several applications levels, hierarchically. The questions formulas are recorded in several fields marked by and related into their own patterns of the answers. This way the answer is described by the number from a range of <-100; 100>.

Every answer is compared with a content of patterns and scripts directives table. They switch in or out into the interaction formulas, with simple or conditional algorithm of the answers validation.

5. CONCLUSIONS

The discussed above database content interactivities were elaborated to handle with multimedia files used for education. Our various works for medical research centres provided us with big number of graphics illustrating these disease cases that can be explored in a short time in case the database is constructed under the MAMS structure. These medical databases are also often used for educational purposes.

The remote localisation of the servers needs well-organised interfaces for data distribution management, as the discussed above:

- the distance learning services,
- the interactive interfaces for the application development,
- the application selection and the application repetition management by MAMS and QRU facilities.

The Quality Repetition Unit – QRU, controls the presentation sequence composition and describes the knowledge level of the course user.

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