

*medical databases, tele-medicine, multimedia,  
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## **ADVANCED INTERFACES FOR REMOTE USERS OF NETWORK MULTIMEDIA DATABASES**

The multimedia databases organisation and management needs various standardisation for simplifying their structure and access methods. They allow integrating different levels and different techniques of programming. The paper describes several aspects of Medical Centre Services organisation that offers various services via Internet standards. Several multimedia systems for training processes have been implemented in this package for network information content development and distribution.

### 1. INTRODUCTION

Many works has recently been done within Internet resources distribution; among them multimedia databases content overworking. The multimedia applications use reach graphical interfaces and complex formats of graphics, animation and various audio effects. Although many efforts have already been done on this field new challenge one can observe that provide the Internet applications demands [1], [2].

The paper shows different services needed to approach the Internet databases via remote terminals. Complexity of the database content implies an interface structure that makes possible to explore the database via sequence of questions. This way the wanted database part can be selected [4]. This project contains modification of the system already evaluated for Distance Learning system. Anyhow it can also be implemented for medical centre consulting services, where instead of student a visitor was recorded. The system's teacher was replaced by doctor of medicine. The deanery unit was replaced by registration desk officers.

### 2. THE SYSTEM UNITS CHARACTERISTICS

Five functional parts [6][7] were defined in a Distance Learning System (DL), discussed in this paper that allows to find and to distribute the e-content users:

- doctors unit,
- visitors/patients unit,
- information desk unit,
- the network node administrator,
- guests unit.

2.1. THE DOCTORS UNIT

Every doctor can create his own website containing personal data, as: e-mail address, work schedule, works specification, photographs, etc. Some of data items are available by any visitor, another are accessible by logged-in patients only. The front page of the researcher website is created by the system administrator.

The system administrator sets a unique login and password for every doctor (or research worker) that allows the user entering the system. These modifications require using any web browser (e.g. Internet Explorer) to approach the website of the Centre. Anyhow the system provides the user with interface that avoids usage of script or hypertext languages (as PHP, JavaScript or HTML).

**The doctors (research worker's) authorization** has to be done in case the user wants to access options available for the research workers only. As a first step he has to enter the system using his login and password, of the network node. The implemented security standards protect the system database from illegal users that was applied in all system modules. After the authorisation process several options are accessible for browsing or editing, as: personal data, consulting schedule, e-mail address, the evidence of visiting patients, list of published books and/or papers, and so on.

Fig.1 The research worker's edit form

**The user personal data** interface has been presented in Fig.1 where several units of information are modified and recorded.

**The file of publications** is recorded in two paragraphs:

- *type* (as: journals, books, handbooks, ...)
- *subject*.

**Consulting schedule** has been presented in Fig. 2. The list contains: day, week, time, place, type and actions – available by the centre visitors.

List of duties								
No.	Day	Date	Begin	End	Room	Type	Actions	
1	Monday	every week	14.00	16.00	307	Consultation	Update	Delete
2	Monday	every week	10.00	11.30	320	Therapy	Update	Delete
3	Wensday	every week	11.00	13.00	320	Consultation	Update	Delete
4	Monday	every week				Consultation	Add	

Fig.2. The consulting schedule

After the consulting record is accepted, by at least one visitor, it can not be removed from the database and it is presented on the consulting centre website (Fig. 3):

Consultations list		
<b>Monday (03.06.30) - hrs 14.00 - 16.00 Consultation</b>		
No. of index	Name	Confirmation
11078	Nowak Zbigniew	<input type="checkbox"/> Message
Confirm		
<b>Monday (03.06.30) - hrs 10.00 - 11.30 Therapy</b>		
No. of index	Name	Confirmation
11078	Nowak Zbigniew	<input type="checkbox"/> Message
Confirm		
<b>Wensday (03.07.02) - hrs 11.00 - 13.00 Consultation</b>		
No registration		

Fig.3 The list of visitors

The doctor confirms the visitors by their consulting schedules. Any additional comments can also be sent to the visitors.

**Messages for groups of patients** for the disease example were presented in Fig. 4.

List of visitors group					
Specialisation	Level	Therapy type	Complex	Group	Send
Psychiatry	Level 5		2	A	Message
Psychiatry	Level 3		2	B	Message
Cardiology	Level 2		2	C	Message
Cardiology	Level 1		1	A	Message
Orthopedy	Level 3		1	A	Message

Fig.4 The visitors group

Browsing the patient’s evidence in case the doctor uses an advanced classification system of Multimedia Application Management System (MAMS) [2], [3] where a list of services (Fig. 5) is available. The menu-driven interface leads the user through the services structure.

MAMS supported subjects	
Psychotherapy	<a href="#">lists of groups</a>
Radiotherapy	<a href="#">lists of groups</a>

Fig.5 The list of services

Selecting any services the visitor can also find the information concerning number of patients already waiting for this visit (Fig 6).

List of patients	
ID	Name and surname
181707	Piotr Kamiński
181711	Paweł Kępiński
987654	Roman Testowy
181754	Wojciech Zakowicz
181757	Łukasz Żbikowski

Fig.6 The list of patients

Finally, the doctor (research worker) creates the individual program of the patient medical treatment schedule, using a built-in website editor.

## 2.2. THE VISITOR / PATIENT UNIT

The patient asking for visits obtains (from the system manager) access permissions to the services database. This procedure goes through several options, from the list given bellow. These options are completed by the patient, visiting the centre services:

- home page interface,
- medical services list,
- unit of obligatory treatment,
- unit of additional treatment,
- multimedia information (MAMS) units support,
- consulting services.

**The patient home page** – contains information about services ordered in medical centre; as in example bellow (Fig. 7).

Patient's page					
Number of patient's index:		12345			
Name:		Adam			
Surname:		Borkowski			
ID	Specialisation	Begining	Therapy type	Group	Visit
ST001	Cardiology	2002	Level 3	A	3

Fig.7. General information.

**Medical services** – are recorded at the website of consulting centre. It contains information that is sent to logged-in patient. Additional information is given automatically during the patients interactions with the information desk officers of the centre.

**The medical treatment monitoring** – option providing the user with various data components that contain evidence of the patient activity (Fig.8).



Fig.8 The interface of patient activity

**Obligatory treatment** - defines the obligatory treatment units. Clicking on an active link, in the title of the subject, full information about the subject is given.

**Additional treatment** – define additional treatment units recommended for completing the therapy. The patient can find additional remarks to his therapy using examples given by applications available in MAMS platform. These interactions are registered and presented (Fig.9) in final record of the visitor.

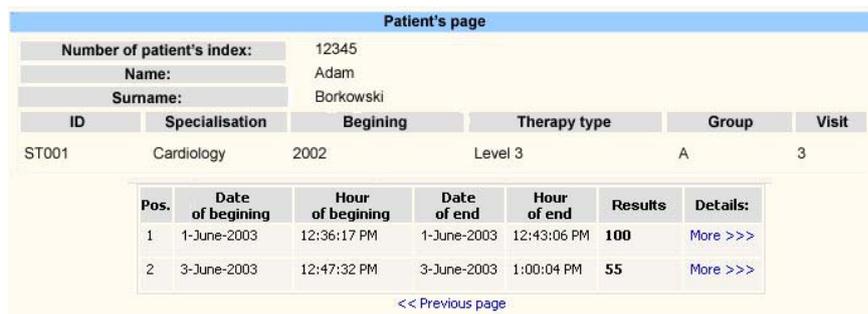


Fig.9. The MAMS interactions record

**MAMS units support** – with interface that enables selection of the required fragment of medical treatment; using multimedia quality with interactions creating a knowledge-based selection of therapy procedures.

**Consulting services** – provide the user with remote enrolling into consulting services, offered by medical centre workers.

### 2.3. THE INFORMATION DESK UNIT

**The information desk** – is provided for patients' visits arrangement and management. Available options: patients' services, the visitors' registration and administration, setting the users' privileges, the system resources distribution, resources of services structure selection. These options allow providing patients with general services. The administration Panel (fig.10) is available after the user was logged-in.

Administrative Console			
Server: Master Server DL (155.158.112.162)		Wersja polska	
User: <b>Information desk</b>	<a href="#">Change password</a>	<a href="#">Logout</a>	
Free space at WWW directory: 1334.03 MB			
Units			
No	Name	Description	Actions
1	Main groups		<a href="#">Run</a>
2	Therapy groups		<a href="#">Run</a>
3	Menu		Access denied
4	Information desk		<a href="#">Run</a>
5	Pages		Access denied
6	Research workers		<a href="#">Run</a>
7	Specialisations		<a href="#">Run</a>
8	Patients		<a href="#">Run</a>
9	Therapy		<a href="#">Run</a>
10	Message Center		<a href="#">Run</a>

Fig.10. Administration Panel

**The treatment selection (therapy)** – supports creating the medical treatment program selection (Fig.11); setting kind and duration of the treatment, selecting all program, getting additional information about available therapies and other necessary comments.

Therapies			
Beginning/Course/Level/Schedule code		Actions	
2002, Psychotherapy, Level 4, (ST001)	Basic data Subjects	<a href="#">Clone</a>	<a href="#">Delete</a> <a href="#">Send Message</a>
2003, Surgical operation, Level 2, (ST002)	Basic data Subjects	<a href="#">Clone</a>	<a href="#">Delete</a> <a href="#">Send Message</a>
2002, Radiotherapy, Level 1, (ST003)	Basic data Subjects	<a href="#">Clone</a>	<a href="#">Delete</a> <a href="#">Send Message</a>
2002, Blood transfusion, Level 3, (ST004)	Basic data Subjects	<a href="#">Clone</a>	<a href="#">Delete</a> <a href="#">Send Message</a>
2003, Physiotherapy, Level 1, (ST005)	Basic data Subjects	<a href="#">Clone</a>	<a href="#">Delete</a> <a href="#">Send Message</a>

Fig.11 List of available therapy programs

Options available on the list of therapy units:

- information about therapy units – by clicking the „specialisation code”,
- general information,
- subjects – where opening, editing and removing subjects for individual,
- clone – for copying one of offered programs,
- delete – for removing selected program,
- send a message –for sending messages to every patient of the selected therapy schedule.

**Therapy groups** - are created by interface presented in Fig. 12, where the list can be modified in a following way:

- add the group of therapy,
- edit the group content,
- delete the group from the list,
- send a message – to every patient of the group.

Therapy groups						
ID	Therapy	Start	Level	Doctor	Groups	Options
ST001	Physiotherapy	2002	Level 3	MD Jan Kowalski	<input type="button" value="v"/>	<input type="button" value="Edit"/> <input type="button" value="Delete"/> <a href="#">Add group</a>
ST002	Chemotherapy	2002	Level 2	MD Robert Wolny	<input type="button" value="A v"/>	<input type="button" value="Edit"/> <input type="button" value="Delete"/> <a href="#">Add group</a>
ST003	Radiotherapy	2003	Level 4	MD Janina Adamska	<input type="button" value="B"/> <input type="button" value="C"/> <input type="button" value="A"/>	<input type="button" value="Edit"/> <input type="button" value="Delete"/> <a href="#">Add group</a>

Fig.12 Therapy groups

The patient selects one of the therapy lists with following options:

- editing personal data,
- removing the patient name from the list,
- editing history of medical treatment.

**Workers** – that contain information about workers, as: personal data, professional career, specialisations, hobbies, etc.

**Messages management** – used by information desk services sending short messages to the patient.

### 2.4. THE ADMINISTRATOR SERVICES UNIT

This unit provides the set of tools for:

- entering the users into the data base,
- levels of services definition for new users (rights, available modules),
- rearrangement of all options of the system structure,
- entering extensions of the system structure and modules.

The graphical interface resembles *Administration Panel* mentioned in this chapter.

### 2.5. THE GUEST UNIT

A not identified user (guest) has permission for following content exploration only:

- the department presentation,
- staff home pages (schedule of works and consulting),
- whole description of available subjects,
- services schedule and possible rearrangement,
- news and remarks.

## 3. CONCLUSIONS

The presented set of interfaces and tools available for Remote Services of Medical Centre or for Distance Learning System significantly simplifies management procedures and content exploration of the network multimedia databases.

Six characteristic features can be distinguished in Distance Databases distribution:

- flexible interface for entering new extensions,
- tool-oriented development environment (build-in editors),
- menu driven web interfaces,
- sub-databases creation for local users,
- links for advanced classification system (into Multimedia Application Management System (MAMS) [2], [3]),
- security standards implementation[5], for personal data and content of the system protection.

Considering all these features Distance Data-distribution System can be used for various services management, teaching and training in different disciplines (as medicine, computer science and others).

The implemented services in Distance Learning Systems can also be used in tele-medicine services that require controlled interactive medical demonstration units. The tool-oriented development environment causes the system easy handling, for configuration and modifications by not qualified user in web programming skills.

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