

## Editor for a Light Shell for Expert System Working on a Mobile Information Terminal

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**Abstract:** *This paper describes the developed editor for a light shell for expert system working on a mobile information terminal on the base of production rules. It aims at facilitating the process of knowledge acquisition.*

**Key words:** *Expert System, Mobile Information Terminal, Production Rules.*

### I. INTRODUCTION

The aim of this developed paper is to facilitate the process of knowledge acquiring as the man-expert can introduce knowledge in the system by himself. He realizes the main possibilities that are necessary when the expert system (ES) [2, 3, 4, 6, 7, 8] is set:

- Facts management in knowledge base (KB);
- Work with poly-semantic or undefined information;
- Management of mechanism in order to obtain meaningful information from the ES user;

The output data of the project are the programming language MIDletPascal [1, 5] for mobile information terminals, expert knowledge for experimental setting-up of the module, the structure if the inner presentation of knowledge.

The user is given possibility to choose from the following options from a menu:

- Facts addition to KB;
- Facts review in KB;
- Fact verification in KB;
- Declaring an object as poly-semantic;
- Introduction of inner values for an object;
- Introduction of question to an object;
- Answer to a question;
- Rules addition;
- Reading data from archive of records;
- Data record in record archive;

Two record archives are used in the process of project developing:

- RUL – it contains processes expert knowledge in the form of questions to the user, permitted values for answers and production rules for conclusion  
IF<prerequisite>THEN<conclusion>
- DEF – it is used when the results from the consultation are taken out and contains the following information  
<meaning of an object - aim> = <text for decoding>

### 2. PROGRAM PRODUCT REQUIREMENTS

The developed paper is part from a program system for working out an expert system on the base of production rules. Its aim is to facilitate the introduction of rules in the system by realizing the main possibilities necessary to system setting and working:

- Facts management in KB;
- Presentation of inexactnesses;
- Usage of poly-semantic expressions;
- Operating the mechanism of receiving meaningful information from the user;

The following requirements are necessary for that reason:

- the module has to service the expert system built on the base of production rules;
- there has to be a possibility for introduction, review and verification of facts in KB;
- there has to be a possibility for introduction and review of questions in KB;
- there has to be a possibility for introduction of permitted values for objects;
- there has to be a possibility for addition of production rules;

The RUL record archive is expected to be used in the process of developing the project. That RUL record archive contains processed expert knowledge in the given subject field as questions to the user, permitted values for objects, production rules for conclusion.

The program module has to have the possibility to read from the RUL record archive. Information for KB and content record of system working memory in the file has to be obtained at the same time.

The record archive DEF that contains the object meaning (aim and text for decoding) is expected to be used to facilitate the system setting and take out the results from the consultation.

### **3. PROJECT DESCRIPTION**

#### **3.1. Project detailed design, structure and system main details**

The developed project is part of a program system for developing of Expert system on the base of production rules.

When starting, the users are given options to choose from a menu of working regime:

- Editing mode;
- Consultation mode;
- Exit;

The option realizes through putting the light cursor onto the desired mode and confirming with RETURN.

When choosing the editing mode, the program module, editor of ES, starts. The structure of the system is presented in Fig.1.

A submenu (editing mode) appears on the screen. That submenu offers the following options:

- Facts addition to KB;
- Facts review in KB;
- Facts verification in KB;
- Declaring an object as poly-semantic;
- Introduction of permitted values;
- Introduction of questions;
- Answer to a question;
- Rules addition;
- Reading a file;
- Record in a file;

The corresponding program modules start with the choice of one of the options and confirmation with RETURN.

When typing or introducing some information from the keyboard, the following templates appear on the screen in order to facilitate the user:

- When introducing a fact:  
<OBJECT> = <MEANING> CV = <VALUE>
- When introducing permitted values for objects:  
<OBJECT> = <MEANING 1>, <MEANING 2>...

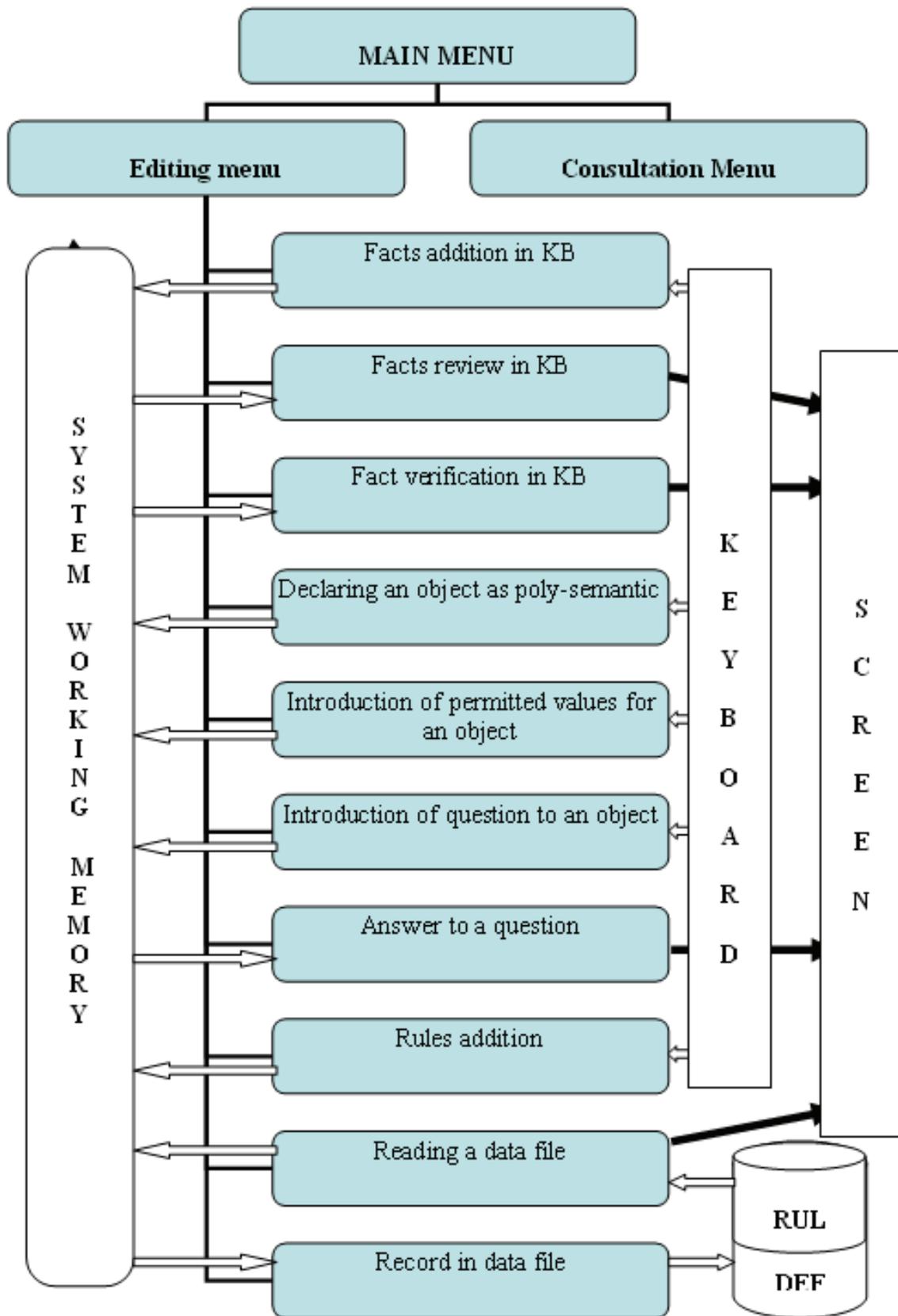


Fig.1. The structure of the system

- When introducing a question to an object:  
<OBJECT> = <TEXT>
- When introducing rules:  
IF  
<CONDITION>  
THEN  
<RESULT>

The condition and the result of the rule are presented in the form of facts and conjunction of facts is available as well.

### 3.2. Data organization

The following types of data are used in the present elaborated paper:

Data that is necessary to be kept for a long time since it is used repeatedly.

The data is organized in record archive and are kept in flash memory of the mobile information terminal. Record archives contain text information set in rows in a definite format.

- a) RUL record archive, containing processed expert knowledge in given subject field in format:

*Questions to the object:*

QUESTION <OBJECT> = <QUESTION TEXT>

Question text is as long as 256 symbols as every row contains up to 80 symbols. At the end of the row the symbol '\ ' is used in order to mark the rows belonging to a given question.

For example:

Question (c1) = Is there a knock with a low, hollow tone in the zone of the crankshaft in full loading?

*Permitted values of the objects:*

PERMITTED <OBJECT> = <MEANING 1>, <MEANING 2> ...

For example:

Permitted (c1) = yes, no

*Production rules for conclusion:*

IF  
<CONDITION>  
THEN  
<RESULT>

The condition and the result of the rule are presented in the form of facts and a conjunction of facts is available in them:

<OBJECT> = <MEANING> CV = <VALUE>

The symbol 'and' is used to mark a conjunction. That symbol differentiates it from the conjunction 'and'.

The symbol '-' is used to mark the end of a rule.

For example:

IF  
c1 = yes  
c2 = no  
then  
damage = d1  
damage = d2

b) records archive DEF. The records archive is used to facilitate the introduction of results from the consultation. It contains meanings of objects – aim, organized in the following format:

<MEANING OF MEANING> = <VALUE OF MEANING>

The value of meaning is as long as 255 symbols. The symbol '\ ' is put at the end of a given row to mark out that it belongs to value of meaning.

The records archive DEF is mainly used in the mode consultation for decoding of meanings of object – aim.

#### **4. CONCLUSIONS**

1. A shell has been developed and elaborated for ES that can be put into practice in numerous subject fields.
2. The accepted approach for knowledge presentation through rules, whose clauses /premise and conclusion/ are facts from the following type 'object=meaning' is universal.
3. Automated development of menu of permitted values of every object, that requires information introduction, facilitates the user interface of ES.

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