

Online DBMS Selection and Analysis Tool:

DSS “E-Analyst”

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Abstract: The Paper emphasizes the advantages of E-learning model and the necessity to ensure that students develop required professional skills during online course delivery. Current paper describes Decision Support System (DSS) “E-Analyst” developed in Abu Dhabi Men’s College (UAE). The DSS is used as an analytical tool that helps to select the most suitable DBMS for the Projects students are assigned to. DSS supports multicriterial analysis of the User requests, 2-stage Decision making process, active interaction with the users, and additional up-to-date information about DBMS, and the links to the related sites. The DSS is used as the Support Learning Tool for the following online courses: System Analysis, System Development Tools, Management Information Systems.

Key words: Database Management Systems, Decision Process, Decision Support System, Online learning, Professional Skills, Web-based DSS.

1 Introduction

Implementation of E-learning technologies into course delivery has changed educational model from “Teacher”-centered to “Learner”-centered. “Learner”-centered model puts a student in the center of the learning processes and it requires an active and responsible participation of the learner by making own decision when and where to study the subject, to submit all required assignments, quizzes, projects, tests. “Learner-centered” model develops new skills like time management, course content management, ability to participate in online discussions, to express and to defend personal views and opinions, and conduct self evaluation.

Being commonly accepted as an efficient and

effective course delivery method, the implementation of E-learning methods for each specific course is facing certain challenges (Henderson, 2003):

- To provide objective evaluation of what did students learn during the online course.
- Are students able to perform real life tasks after taking online courses?
- How the online course content contributes to their professional effectiveness?

The experience shows that course goals can be achieved effectively if online content includes multiple components that are supplementing each other (White & al., 2000):

- Visual and audio representation of the course material;
- Examples and exercises to show how real life

problems could be solved using the knowledge gained during online instructions;

- Interactive practical exercises aimed to develop skills necessary to handle real life tasks;
- Online discussions to identify students views on the specific topic and evaluate level of understanding of the questions offered for the discussion;
- Self tests and quizzes;
- Video interviews with the professionals who are sharing their knowledge and experience in the specific business/technology areas;
- Providing access to the information systems that simulate professional activities and the decision making processes.

DSS “E-Analyst” is offered as an analytical tool for the students who are taking the following courses: System Analysis, System Development Tools, Management Information systems, Project management. It can also help IT professionals: System Analysts, Project managers, and System Administrators to verify their decisions regarding DBMS.

2 General Information about DSS “E-Analyst”

2.1 Purpose of the DSS “E-Analyst”

Each IT Project contains a phase when the selection of appropriate Development Tools must be made according to: project functional requirements, size of the project, application area, access methods, access control, and the security requirements (Hoffer & al., 2002). In most cases there is necessity to choose an appropriate Database Management System (DBMS). In real life this process is based on different subjective factors, like individual experience of the participants, availability of the licenses, price, etc. The same happen when students are selecting DBMS for their projects.

Obviously, today IT market is offering large number of different Database Management Systems, aimed for different applications, hardware platforms, and Operating Systems. And if we require to provide objective analysis of the current DBMS market, and provide complete verification of the choice made for the project needs, the process may become too long, complicated, and inefficient due too amount of available information, its redundancy , necessity to conduct complicated search and perform detailed analysis of the selected information. Thousands of different websites provide useful and questionable advices how to choose correct DBMS for your business needs (Mullins, 2002).

DSS “E-Analyst” solves some of these problems by offering access to carefully selected, verified, and

organized information about the DBMS market, provides direct links to the reliable sites that contain details about the chosen DBMS: Developers’ and vendors’ Home pages, online tutorials, certifications, books, projects that involve specific DBMS .

DSS “E-Analyst” supports interactive Decision making Process that is based on using set of criteria (usually, the most important for the IT-based projects) and level if its ranking in order to produce objective advice regarding DBMS that can help IT Professionals or students to make the final decision .

2.2 DSS Features

The following features are implemented to make DSS “E-Analyst” easy accessible, flexible, user-friendly, and reliable (Powers, 2004):

- DSS is Web-enabled;
- Decision process is Data and rule driven;
- Decision process is based on active interaction between IT Professionals/Students and the system;
- DSS provides detailed explanation about the decision making process ;
- System accumulates the statistics;
- DSS controls user access by requesting registration from the users and maintaining different interfaces for the each group/type of users according to their tasks;
- System accumulates users’ feedback and the reviews posted by users with their evaluation of DBMS;
- Provides up-to-date information about DBMS available on IT market.

2.3 DSS Components

The key functional components of the DSS (Watson & al., 1996) are :

- **Database** that contains :
 - Detailed information about DBMS available on IT market, information is organized according to the selection criteria;
 - Reference tables contain direct links to the Developers and vendors Websites, Project websites, Online tutorials, Analytical reviews, and other sites;
 - Decision tables – contain step-by-step description about the previously made decisions according to the set of different criteria, and their ranking for each submitted request;
 - Criteria tables contain list of criteria chosen for the DBMS analysis and selection. The choice of criteria is based on detailed research and interviews with IT professionals: analysts and project managers;
 - Registered user table with their profiles;
- **User Interface** is designed by taking into account that DSS users are IT professionals/IT Students and, additionally to the common requirements for the user interface design

(Kendall & al., 2002), there are some “special” constraints which are implemented in the Website design:

- Correct usage of the professional terminology;
- Maintaining user interaction with the system during decision making process in order to get the best possible solution;
- Clear and short help messages to guide the users how to perform correct data input and understand the functions performed on each web page
- **Decision-making process** consists of two sequential steps:
 - Initial request – selection of the criteria, its values, and assigning the ranks to each criteria, processing the request and displaying the result of the execution that usually contains list of DBMS that correspond to the chosen criteria;
 - Second Stage – when the user has to evaluate the result of the initial request by assigning additional weights to the search result and the final result is displayed when evaluation is submitted to the system;
- **Explanation module** helps to restore step-by-step decision making process; the intermediate and the final result with the corresponding criteria can be displayed on user request;
- **System Administration** component is accessible only to DSS Administrator who is responsible to maintain databases, regularly upgrade data in DBMS tables, check user registration, trace user activities, run statistical reports and check user feedback records.

3 System functionality

3.1 Website Plan

The following Diagram shows hierarchy of Web pages, and navigation between them.

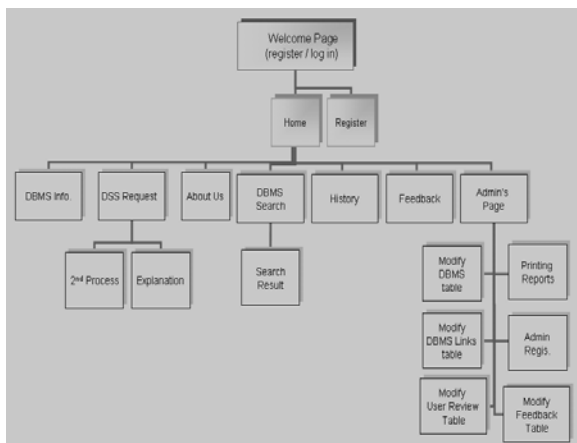


Figure 1. Website Plan.

3.2 Website Functional Description

Each of the above shown pages is responsible for the specific set of functions:

- **Main Page** - The main page provides the user with two options:
 1. To login into the system (for registered user);
 2. To enter a request for registration (for a new account).
 System supports access for the following groups (types) of users: students, system analysts, and DSS administrators.
- **Registration** – This page contains a registration form for system analysts and students. Each of them has to fill common information like name, country, and date of birth. Then, additional information needs to be entered to create a user profile.
- **Home** - Home is a default page the user is directed to once the log in process is done successfully. It will contain general information about the website and will show specific links based on the user logged in.
- **DBMS Info** -The page contains essential information and can be used to get the details about the DBMS. In addition, all users can access this page and add own reviews about DBMS performance based on their personal experience; users have rights to assign a rating to the specific DBMS. It will be stored in the database and used for the statistical analysis and reports on DBMS performance.
- **DSS Request** - This page is exclusive for system analysts and project managers. It offers a number of criteria to be used for the DBMS selection with the corresponding fields for ranking. The information submitted will be processed, analyzed and calculated. Then the user will be directed either to the second process page or to results page, which will provide links for explanations and DBMS details.
- **History** - The page displays analyst's request details and the decisions (results) made previously. This can be useful for the System Administrator to view and analyze information about the previous requests
- **Feedback** - Feedback page has a form to enter users' comments and suggestions about the website, and DSS functionality. This page is displayed to both students and system analysts.
- **Admin's Page** - This page allows the DSS Administrator to update specific tables in the database. In addition, one of the functions is to update or delete users' reviews or feedbacks. On the other hand, there is an option to add another Administrator to the system and only the users who is already DSS Administrator can perform that function.

3.3 Examples of User Interface Implementation

The following snapshots will illustrate user interface implementation in DSS “E-Analyst”. As it was mentioned previously, the user interface is simple, clear, consistent, and flexible (Mandel, 1997).

Lack of complicated graphics, and animations, consistency of the page design, correct usage of the professional terminology, short instructions – these are the features that allow to create comfortable working environment and help users to concentrate their attention on the tasks to be performed and the results received after the request has been processed.

3.3.1 Login Page User Interface.

Only registered users are authorized to use the system by entering their email and password. Thus, at the right side of the page users need to log into the system. If the user is not registered in the system, there is a link to proceed with the initial registration.

The validation applied in this page is to ensure that correct data is entered in the text fields. At the same time, the server validates user information to determine whether authentication should be gained. Moreover, it verifies the signing authentication and saves the cookie on users demand.

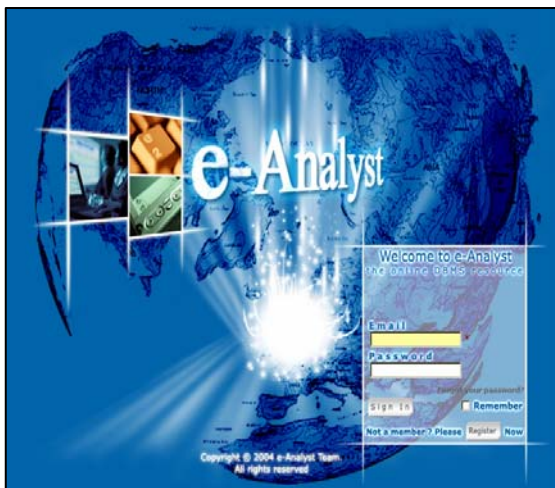


Figure 2. Login page.

3.3.2 User Registration Page

The snapshot below illustrates a sample form in the registration page. There will be two different forms for the system analysts and students. Common part of the form contains fields with the general information about the user. However, once the user specifies “User Type”, the fields below that drop down list will change according the user’s type to add extra information. It is obvious that the example shown below is for the system analyst registration.

There will be validation of all fields to make sure that no field is left empty or contains invalid entries. On the other hand, the system will check whether the user is already registered in the system or it is a new user by checking the email address, which must be unique. System Administrator’s registration can be

done on the admin’s page.

Figure 3. Registration Page

3.3.3 DSS Request Pages

This page is used by system analyst to enter the request. The user has to select at least one criteria out of the list, choose the value appropriate to the project requirements, and assign ranking (1-6) to each of the selected criteria (Figure 4). The user then submits the criteria, which are processed in the system and then the user will be directed either to the second request page (Figure 5) - in case of multiple result or to the result page. The Second Stage (Figure 5) helps to evaluate the result of the Stage 1 by assigning weights to the initially calculated results. The user is requested to interact with system in the decision making and enter the weights (1-10) to the actual values of the selected criteria. The evaluated request will be submitted into the system to finalize the selection, and display the result.

Figure 4. Request Page 1

Second Process

Add a rank for each value displayed.
10 gets you the highest rank (most satisfactory)
While 0 indicates that the value is absolutely not applicable.

Name	Cost	Ranks	OS Platforms	Ranks
Microsoft Access	\$229.00	2	Windows	2
Adaptive Server Enterprise (ASE)	\$1,495.00	6	Window, Linux & Unix	6
MySQL	\$495.00	6	Window, Linux & Unix	10

Proceed to final decision Reset

Figure 5. Request Page 2

Two-stage request processing and the user active interaction with the system has obvious benefits by making the selection objective (based on formal project requirements) and the same time flexible, reliable and manageable from the user perspective (Shim, 2002).

3.3.4 DSS Administrator's Pages

Administrators' pages are designed to be exclusively used by the system administrators (logged in as admins). These pages support a set of Administrator's functions and the reports so that the Administrator can follow up the performance of the website. In addition, it will provide the option for the Administrator to modify some of the tables in the database. The following is a list of the tasks assigned to DSS Administrator::

1. **Admin Registration.** The Administrator can register another admin. The information will be added by the current Administrator and, the new Administrator can modify his profile.
2. **Generating Reports.** The Administrator can run and view reports that provide statistical data on different aspects of DSS performance and functional activities. These reports can be viewed using three different formats namely Acrobat Reader format (.pdf), Microsoft Excel format (.xls) and Microsoft Word format (.doc).
3. **Modifying and viewing database tables:**
 - **DBMS Table.** It contains DBMS-related information and these tables must be updated by the Administrator regularly.
 - **DBMS Links Table.** It contains the list of useful URLs and the brief descriptions of the content. The information in the table are subject to change, thus following up with their updates is very important activity.
 - **Feedback Table.** Users' feedbacks should be available to the admin to stay updated with

different users' comments and requests submitted.

- **Users Review Table.** The admin needs to check users reviews of the DBMS for analytical and administrative purposes.

Some snapshots from the Administrator's pages are provided below.

Admin's Page

MEMBER AREA

Name: khalf abuhart
Organization: E-Analyst Team
Title: Administrator

Change to different user
Edit My Profile Sign Out

Home Admin
DBMS Table
DBMS Links Table
Feedback Table
Users Review Table

The administrator is the main controller for the website, he manages both the front-end and the back-end. In the website he has access to all pages.

This page contains the major tasks that the admin performs.

Take a look at the sublinks below and the links at the left side of the page:

Admin Registration
Generates Reports

Select a Table: DBMS
Select a file format: Portable Document (PDF)
Export Portable Document (PDF)
MS Word (DOC) MS Excel (XLS)

Figure 6. Report Generator.

DBMS ID	DBMS Name	Manufacturer	Year Of Production	Version	Size in HardDisk	Size in Memory	Cost	Edit
1	Microsoft Access	Microsoft Corporation	2003	2003	Over 30 MB	64 MB for Windows 2000, 128 MB for Windows 2000	\$229.00	Edit
Auto Number	DB2	IBM	2000	8.1	350 Mb	256 Mb	7500.00	Cancel Update
3	SQL Server 2000	Microsoft Corporation	2000	2000	250 Mb (typical installation)	128 MB RAM or more recommended	\$4,999.00	Edit
4	Adaptive Server Enterprise (ASE)	Sybase	2000	12.5	775 MB (typical)	48 MB minimum Plus memory for the operation system and other programs	\$1,495.00	Edit
5	Oracle	Oracle Corporation	2001	9i	4.5 GB (typical)	256 MB minimum	\$15,000.00	Edit

<<< Prev Next >>>

Figure 7. DBMS information updates.

It is necessary to mention that the current paper does not provide full description of the DSS "E-Analyst" from the functional or architectural perspective. It contains the description of the most important components and features that affect the System functionality and the performance.

Conclusion

As it was mentioned previously, DSS “E-Analyst” is the analytical tool that can be used in academic institutions or IT Industry to provide objective verification of the DBMS selection for the project purposes. DSS is not replacing the decision made by professionals but offers additional information and different ways of analysis that difficult to provide in real life situations due to shortage of time, lack of centralized and verified source of information

Among the advantages of DSS “E-Analyst” it is necessary to mention the following (Damareast, 2001):

- **Increased productivity**; this means that the user (IT professional or student) will benefit from having the access to the database that contains updated information about required DBMS with the most important references to the related Websites.
- **Saving Time** – all required data are carefully selected, organized, updated and can be used for the reviewing, analysis, and the decision making without necessity to conduct research, to organize data, and conduct statistical analysis.
- **Ensuring the stability and security**. As it was previously mentioned, security and access control measures are implemented in the system in order to maintain correctness, consistency, actuality of the data, and system processing functions.
- **Comfortable working environment**. This is beneficial for both the users and system administrator. DSS provides tools for easy updates and modification of databases, System Architecture is flexible and allows DSS developers to perform all the adjustments, additions, and modifications quickly and with little interference into existing software. On the other hand, users will experience the ease of use and flexibility of the tools provided..

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