Review Research

Learning using Web Application I-SOAS

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ABSTRACT: *This manuscript reviews a developed software application i.e. I-SOAS, providing conceptual as well as partial prototype support in implementing an intelligent semantic oriented solution towards the problems of multirole user interface, meta data modeling and efficient information extraction in (Desktop and Web based) Product Data Management (PDM) Systems. Going from a more general overview of the proposed approach, this manuscript presents the developed desktop and web graphical user interface of I-SOAS in detail. Going into the details, this manuscript presents each components of the developed prototype to help user in getting familiar in shortest possible time. Furthermore the information about tools and technologies (e.g. Rich Internet Application, Semantic Web, Object Oriented Programming Languages and Database etc.) used during the software development is briefly described.*

Keywords: I-SOAS, Ontology, PDM Systems, Semantic Web, World Wide Web

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1. Introduction

This article presents a prototype solution providing limited support in implementing an intelligent semantic oriented solution towards the problems of multi role graphical user interface development, structuring information for efficient data sharing, usage and extraction in desktop and web based Product Data Management systems [1], [2], [3], [4]. The proposed approach "*Intelligent Semantic Oriented Agent Based Search* (I-SOAS)" [5], [6], [7], [8] consists of four main sequential iterative modules: *Intelligent User Interface*, *Information Processing*, *Data Management* and *Data Representation* (Figure 1).

Intelligent User Interface [9], [10], [11], inspired by an open source measurement analysis desktop software system [24], [25], [26], provides the user system communication module for analyzing the data source, forwarding inputted data for processing and responding back to user with end results. It is divided into two main categories: *graphical user interface and communication sources*, to identify user's structured and unstructured natural language based requests, processing natural language based user's requests to extract results from attached repositories, manage data in database management system and represent system outputted information as the result of user input in user's understandable format.

Information Processing unit [12], [13], [14], [15], [16], [17] defines the quality of solution with improved accuracy in the results'

production. The overall job of this module is divided in five steps*: data reading, tokenization, parsing, semantic modelling* and *semantic based query generation*. Each step requires intensive efforts in development and the main concept behind the organization of these five steps is to first understand the semantic hidden in the context of a natural or digital set of user instructions and generate a semantic information process able model for the system's own understanding and information processing.

1. Data Reader retrieves data from Intelligent User Interface and organizes with prioritization of instructions into a list.
2. Data Tokenizer (Lexer) tokenize instructions into the possible number of tokens.
3. Data Parser parses and semantically evaluates tokens following syntax of the used grammar,
4. Semantic Modeler creates Meta data based semantic models.
5. Semantic Based Query Generator uses semantic models to extract information from the attached repositories.

Data Management module is to store, manage and index data [18], [19]. Furthermore it entertains queries for data extraction and knowledge base [20]. Whereas, the Data Representation module arranges system's generated output data in a user presentable (friendly) format and to meet aforementioned goal its job is divided into six sub modules: *information retriever, information reader, information tokenizer, information parser, information reconstructor* and *presenter*.

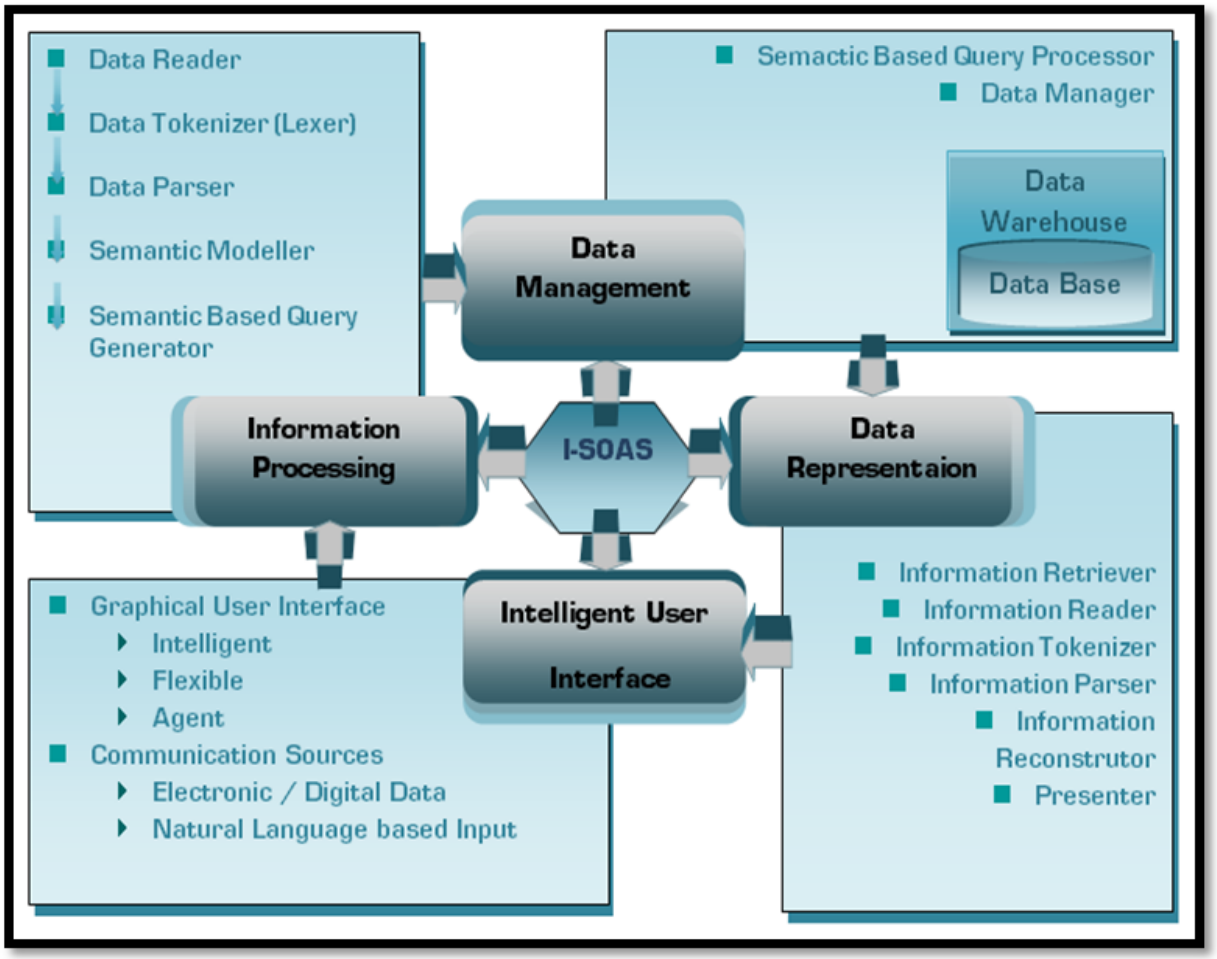

Figure. 1. Conceptual Model: Intelligent Semantic Oriented Agent Based Search (I-SOAS)
Figure Legend: Conceptual Model of I-SOAS is consists of four main sequential iterative modules: Intelligent User Interface, Information Processing, Data Management and Data Representation [5], [6], [7], [8]

2. I-SOAS Desktop Application

Following the implementation designs and meeting system requirements, I-SOAS desktop (prototype) application is developed. Currently available version of I-SOAS is capable of

- Running as a stable application
- Taking input from the user in the form of text file
- Providing little bit flexibility in the organization and presentation of available options in the graphical machine interface
- Creating a dynamic database to store user input based information
- Connect and disconnect different databases
- Opening database to view the stored information
- Configuring files based on their types (extensions)
- Applies Lexer to input file(s)
- Applies Parser to input file(s)
- Stored resultant information in the database
- Building queries to extract stored results
- Produce different kinds of visualizations of stored user based and system processed information in the database

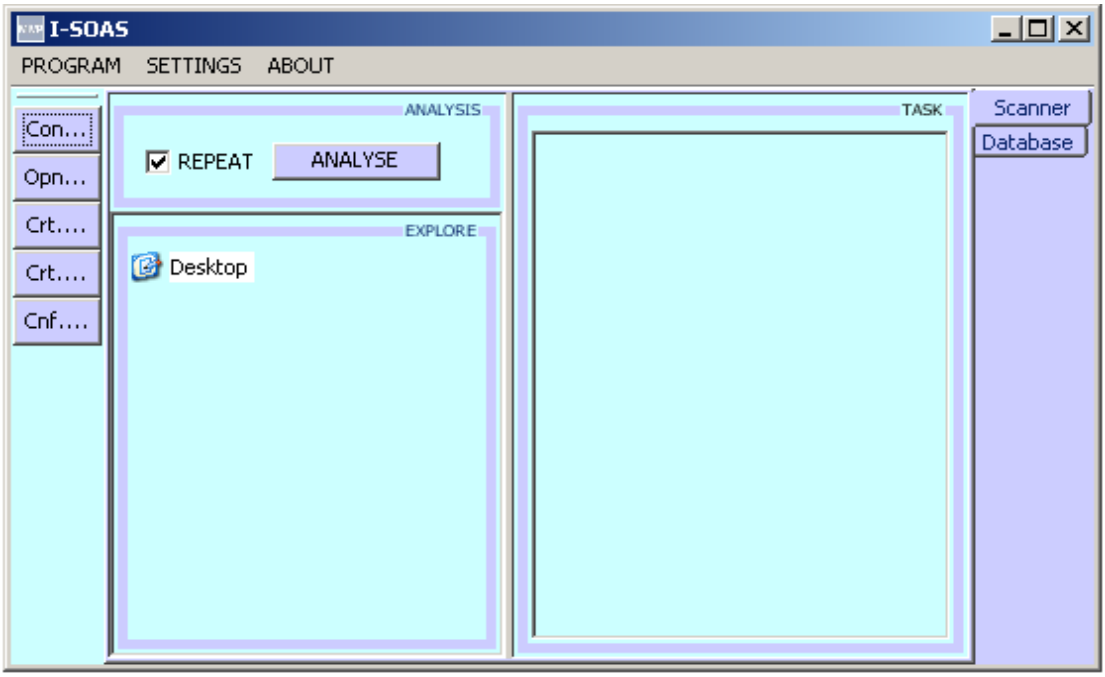

Figure 2. Information Processer

To perform above mentioned jobs, I-SOAS desktop application is divided into ten different front end screens (integrated modules): *Information Processor* (Section 2.1), *Create Database* (Section 2.2), *Open Database* (Section 2.3), *Connect Database* (Section 2.3), *File Configuration* (Section 2.4), *Relation Builder* (Section 2.5), *Query Builder* (Section 2.6) and *Result Visualizer* (Section 2.7).

The desktop application is developed using Java (object oriented programming language) and MySql (relational database management system). Formal UML design methods [27] have been used in designing the software application (including all independent and integrated components). The graphical user interface is designed and developed following human computer interaction (HCI) design and principles [21].

2.1 Information Processor

This is the main front end of the I-SOAS, information processor (Figure 2). The graphical user interface consists of 19 main options / functionalities (Figure 3): provide product information, basic application options (e.g. open, exit etc.) and controls, provides options for searching information, presents the status of information processing, contains the file tree mapping the directory information, provides database interface to import, exporting, edit, save and run script files. Details are given in Table 1.

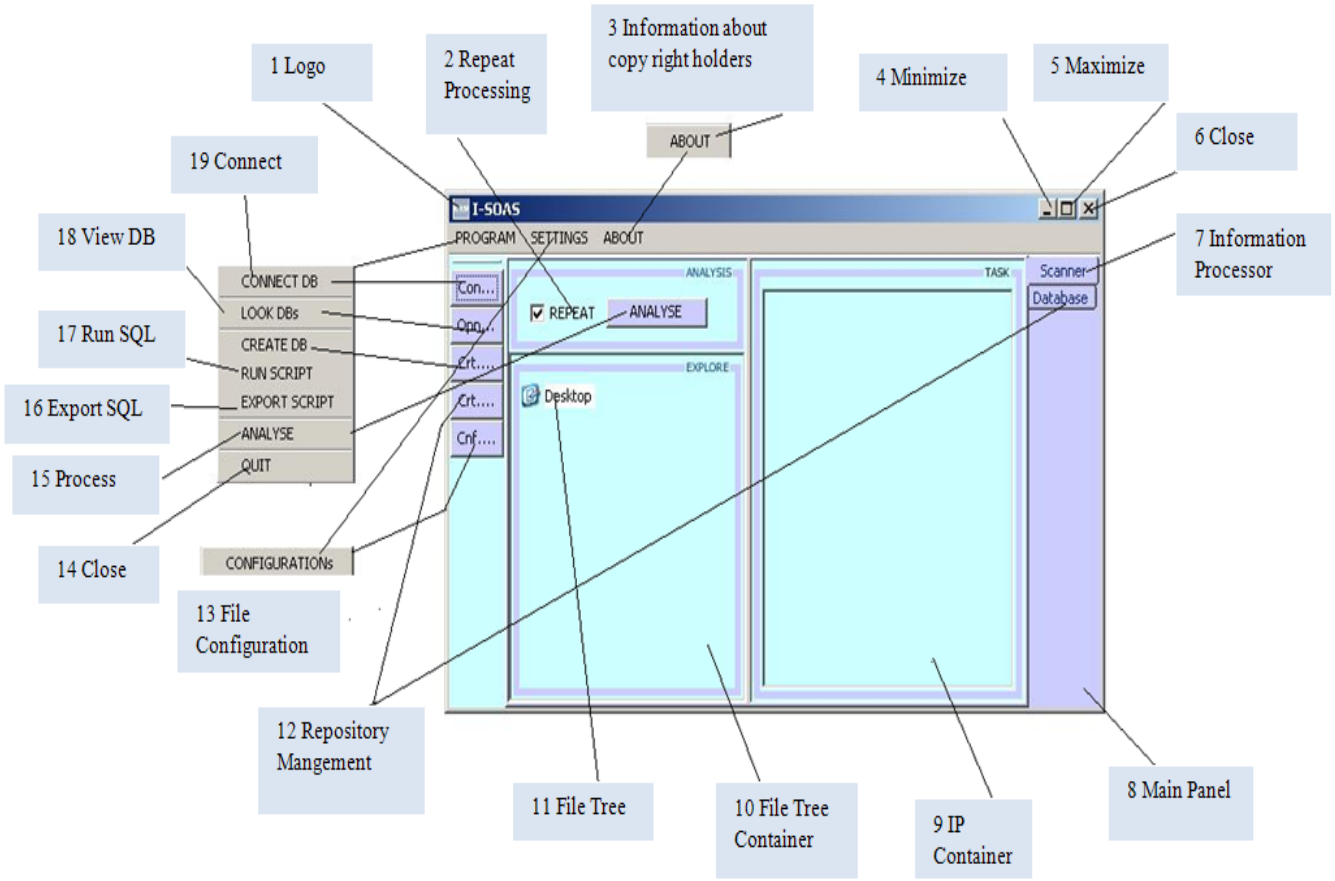

Figure 3. Information Processer Description

2.2 Create Database

This module is to create new database (Figure 4, Table 2).

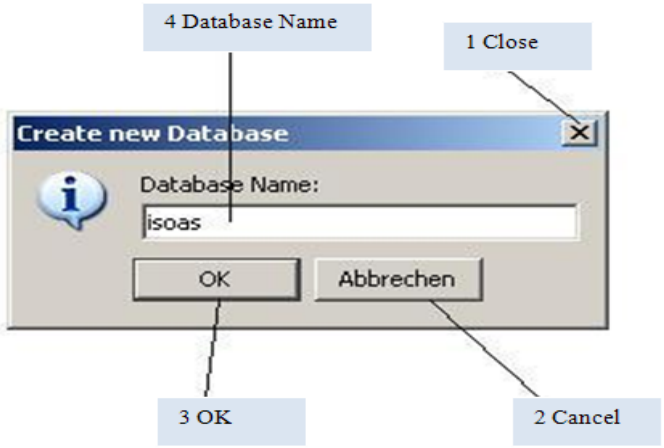

Figure 4. Create New Database

No	Option	Description
1	Logo	Represents owner organization.
2	Repeat Processing	Repeats the process of search for the relevant file then process that.
3	About	About Menu opens About interface.
4	Minimize	Minimizes interface.
5	Maximize	Maximizes interface.
6	Close	Closes the application.
7	Information Processor	Starts information processing.
8	Main Panel	Contains all the controls.
9	IP Container	Presents the status of information processing.
10	File Tree Container	Contains the file tree.
11	File Tree	Maps the directory information into tree.
12	Repository	Opens database interface of I-SOAS.
13	File Configuration	Inputs processable file types.
14	Close	Closes the application.
15	Process	Starts information processing.
16	Export SQL	Exports and saves the SQL based information.
17	Run SQL	Runs SQL to manipulate I-SOAS Database.
18	View DB	Provides the view of database.
19	Connect	Provide interface to establish and test database connection.

Table 1. Information Processing Description

2.3 Open Database

Open Database presents information about available databases and allows user to select one of them at a time (Figure 5, Table 3).

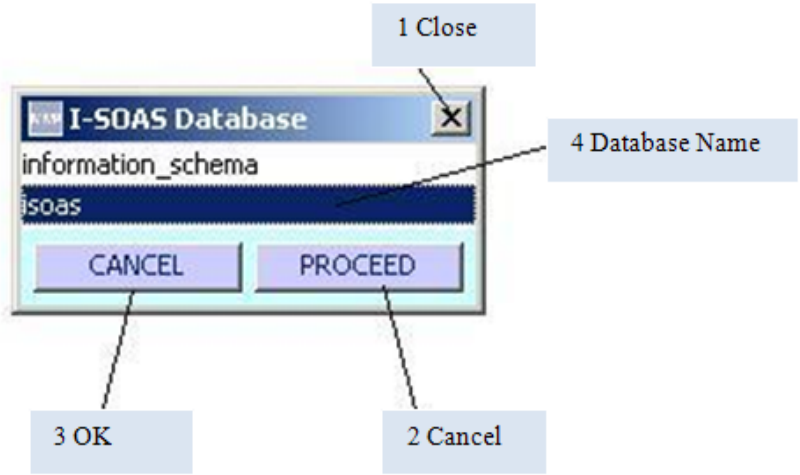

Figure 5. Open Database

2.4 Connect Database

Connect Database provides information about used driver to connect database (host, login details etc.), details are given in Table 4 (Figure 6)

No	Option	Description
1	Close	Closes the interface
2	Cancel	Cancels the operation and close interface
3	OK	Creates new database
4	Database Name	Allows to enter the new database name

Table 2. Create Database

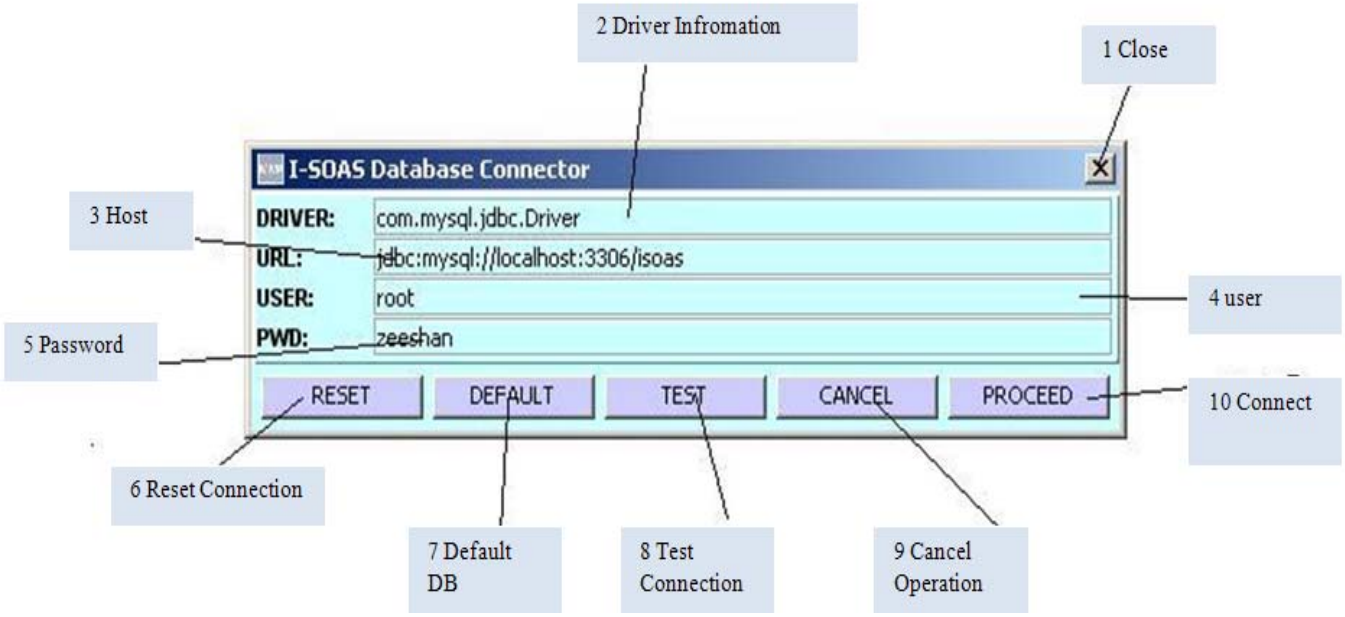

Figure 6. Connect database

No	Option	Description
1	Close	Closes the interface.
2	Driver Information	Provides information about used drive to connect database, user can alter as well.
3	Host	Provides information about host of database, user can alter as well.
4	User	Provides information about user, user can alter as well.
5	Password	Provides information about password, user can alter as well.
6	Reset Connection	Connects to default database.
7	Default DB	Sets current database information as Default Database.
8	Test Connection	Tests database connection.
9	Cancel Operation	Cancels the operation and close interface.

Table 4. Connect Database

2.5 File Configuration

File configuration user to select file type to select and process by information processor (Table 5, Figure 7).

2.6 Relation Builder

Relation builder allows user to deletes selected database, get information about host database and query execution (Table 6, Figure 8).

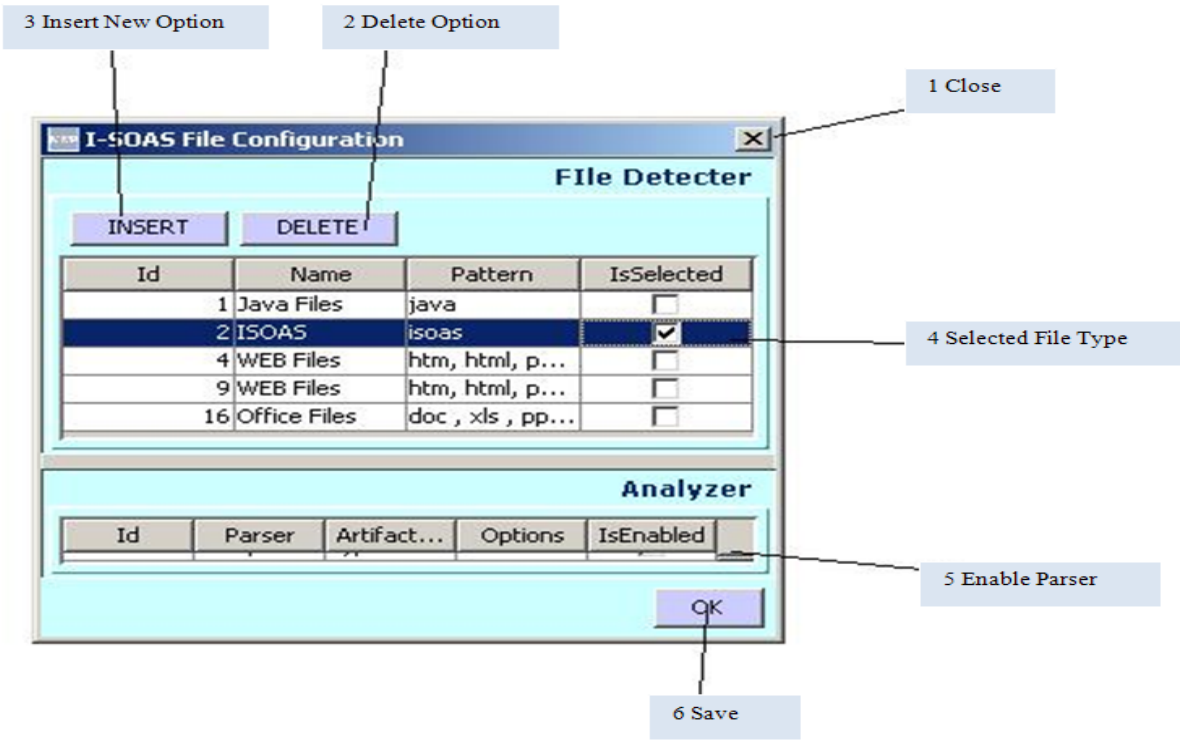

Figure 7. File Configuration

No	Option	Description
1	Close	Closes the interface
2	Delete	Deletes selected file type
3	Insert New	Allows user to insert a new file type
4	Selected File Type	Allows user to select file type to select and process by information processor
5	Enable Parser	Enable Language Parser
6	Save	Saves file configuration information

Table 5. File Configuration

No	Option	Description
1	Delete Database	Deletes selected database.
2	Host Database	Provides information about host database.
3	Run Query	Runs the query.
4	Edit Query	Allows user to edit query.
5	Add Query	Allows user to add query.
6	Add Another Query	Allows user to add another query.
7	Database	Enables database interface of I-SOAS.
8	Processed Script	Interface to add, edit, run and save query script.
9	Results	Presents extracted results from database.
10	Error Report	Report effort (if any).

Table 6. Relation Builder

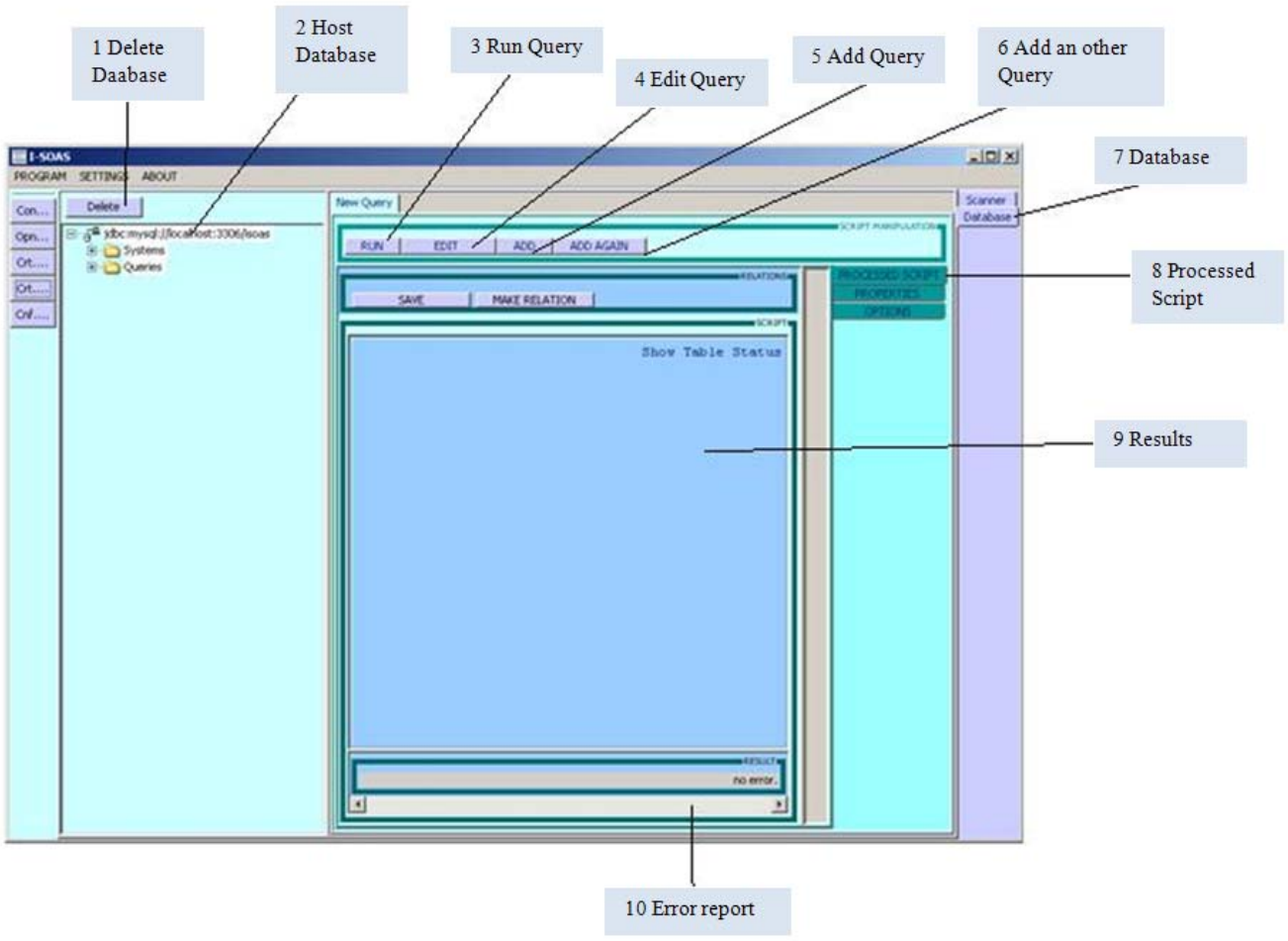

Figure 8. Relation Builder

2.7 Query Builder

Query builder provides interface to write, edit and run queries (Table 6-9, Figure 9-11).

No	Option	Description
1	Caption	Allows user to set the caption of the query.
2	Query Properties	Interface to set and get query properties.
3	Get Query	Opens interface to select already stored query to use.
4	Query Information	Presents the information about query.
5	Contents	These are the parameters to the query.
6	Run Query	Runs the query.
7	Results	Presents the resultant extracted information from database.
8	Query Path	Presents the query path with parameters.

Table 7. Query Builder

2.8 Result Visualizer

Interface to visualize stored dummy and analyzed information in a database (Table10, Figure 12).

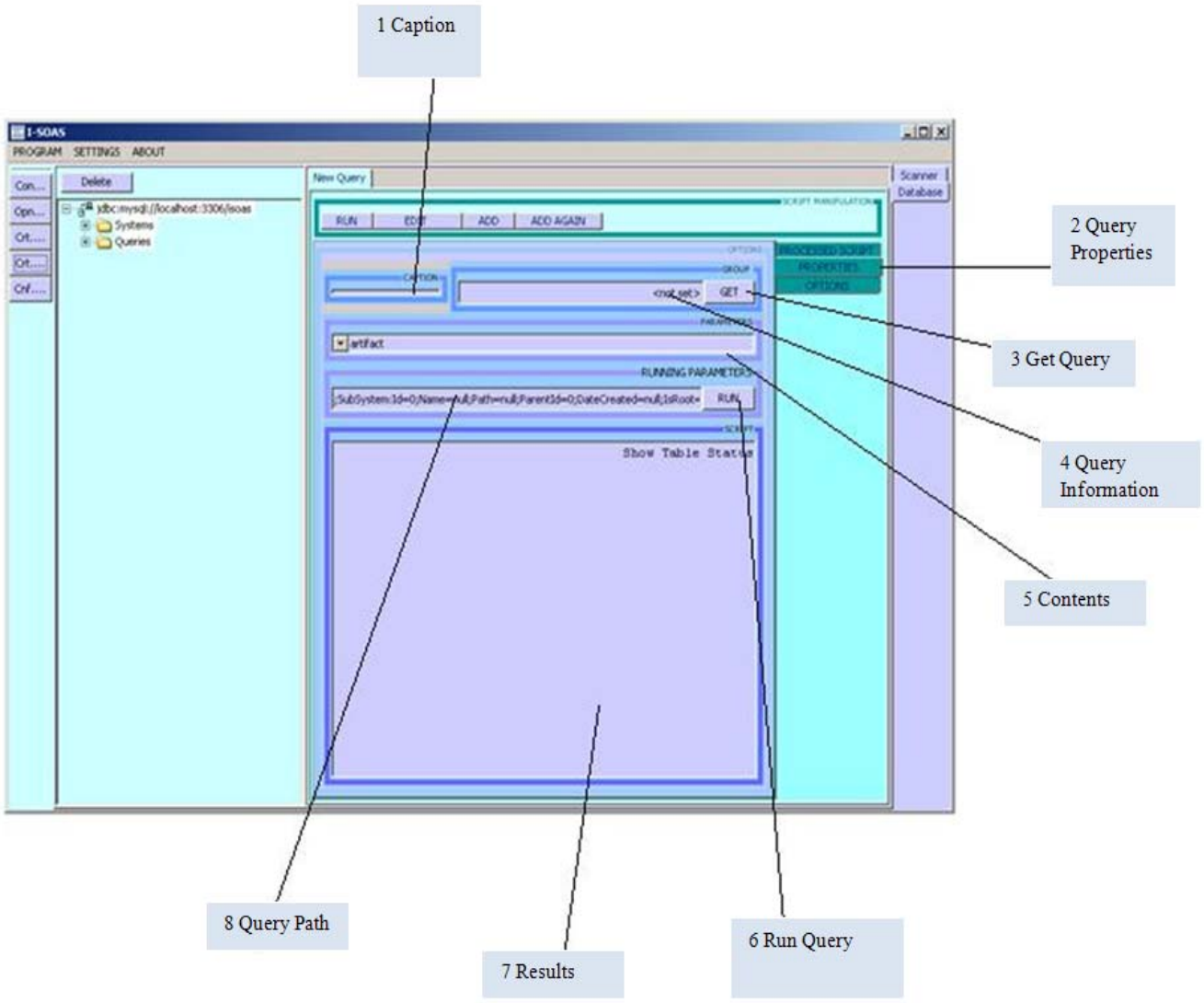

Figure 9. Query Builder

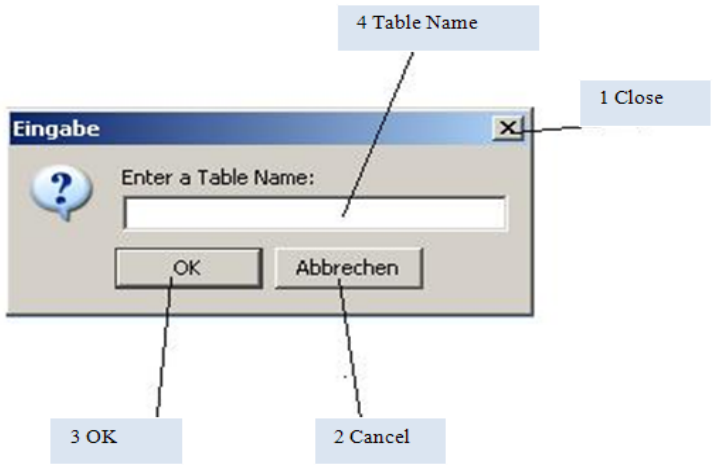

Figure 10. Query Table

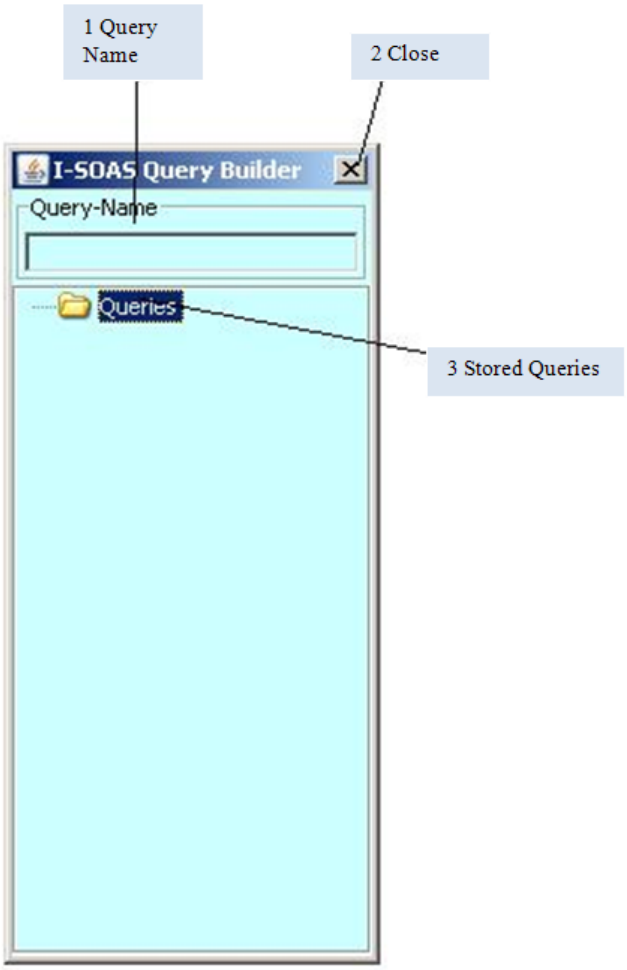

Figure 11. Query Saver

No	Option	Description
1	Close	Closes the interface.
2	Cancel	Cancels the operation and close interface.
3	OK	Creates new table in database.
4	Table Name	Allows to enter new table name.

Table 8. Query Table

No	Option	Description
1	Query Name	Allows to enter query name to select.
2	Close	Closes the interface.
3	Stored Query	Shows already stored queries.

Table 9. Query Saver

2. I-SOAS Web Interface

The web interface of I-SOAS consists of five main page links: *Homepage*, *Search*, *About us*, *Teams* and *Components* (Table 13, Figure 13). This web interface is implemented using Rich Internet Application (RIA) technology i.e. *Flex*, with the involvement of semantic web technology i.e. *Ontology* [22] and *Web Services* [23].

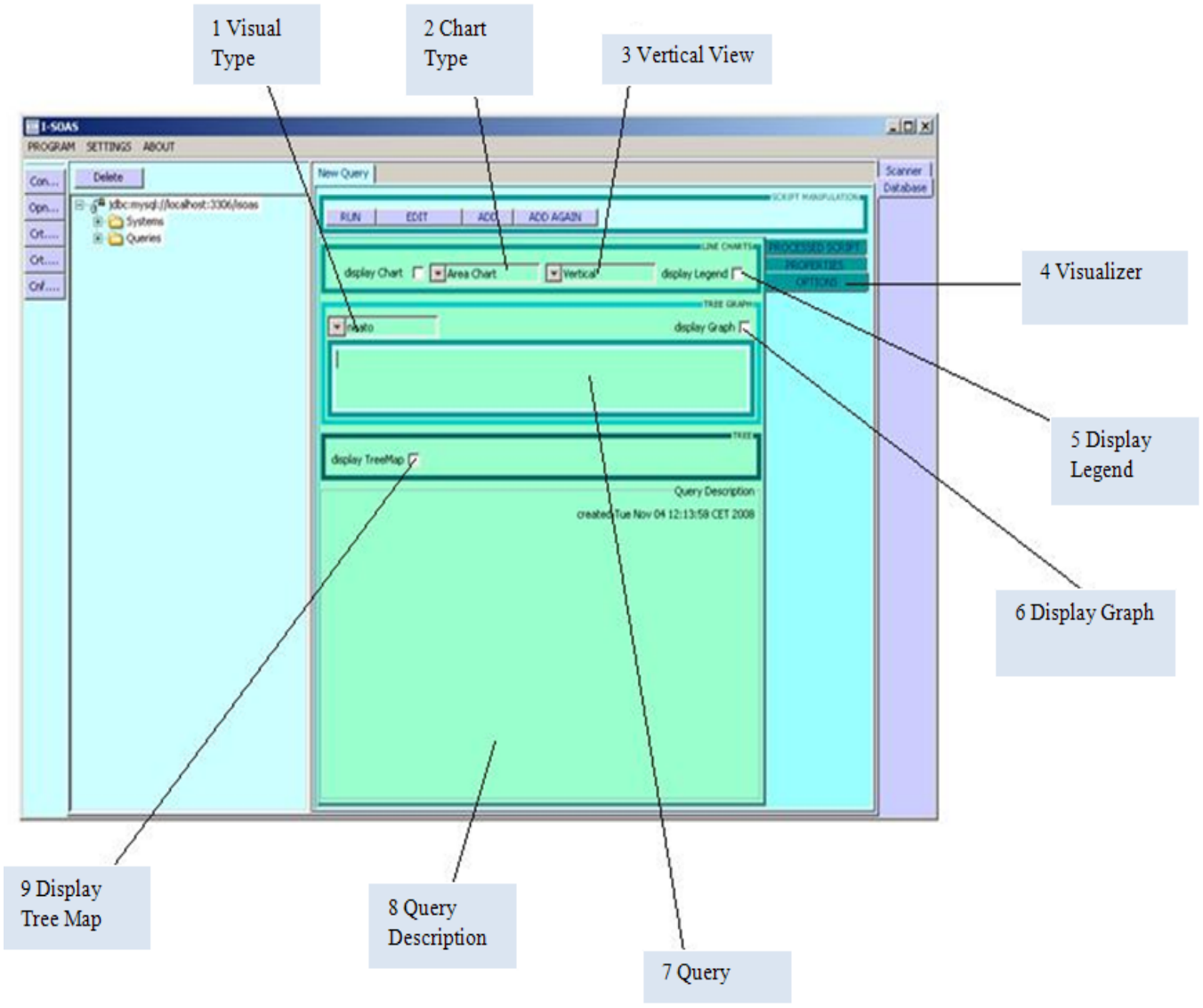

Figure 12. Result Visualizer

No	Option	Description
1	Visual Type	Allows user to select visual type.
2	Chart Type	Allows user to select chart type.
3	Vertical View	Allows user to select vertical or horizontal chart.
4	Visualizer	Interface to visualize stored dummy and analyzed information in database.
5	Display Legend	Displays legendry chart (big one).
6	Display Graph	Allows user to select to display graph.
7	Query	Presents running query, also allows user to edit or type new query.
8	Query Description	Presents the description of used query.
9	Display Tree Map	Allows user to select to display tree map.

Table 10. Result Visualizer

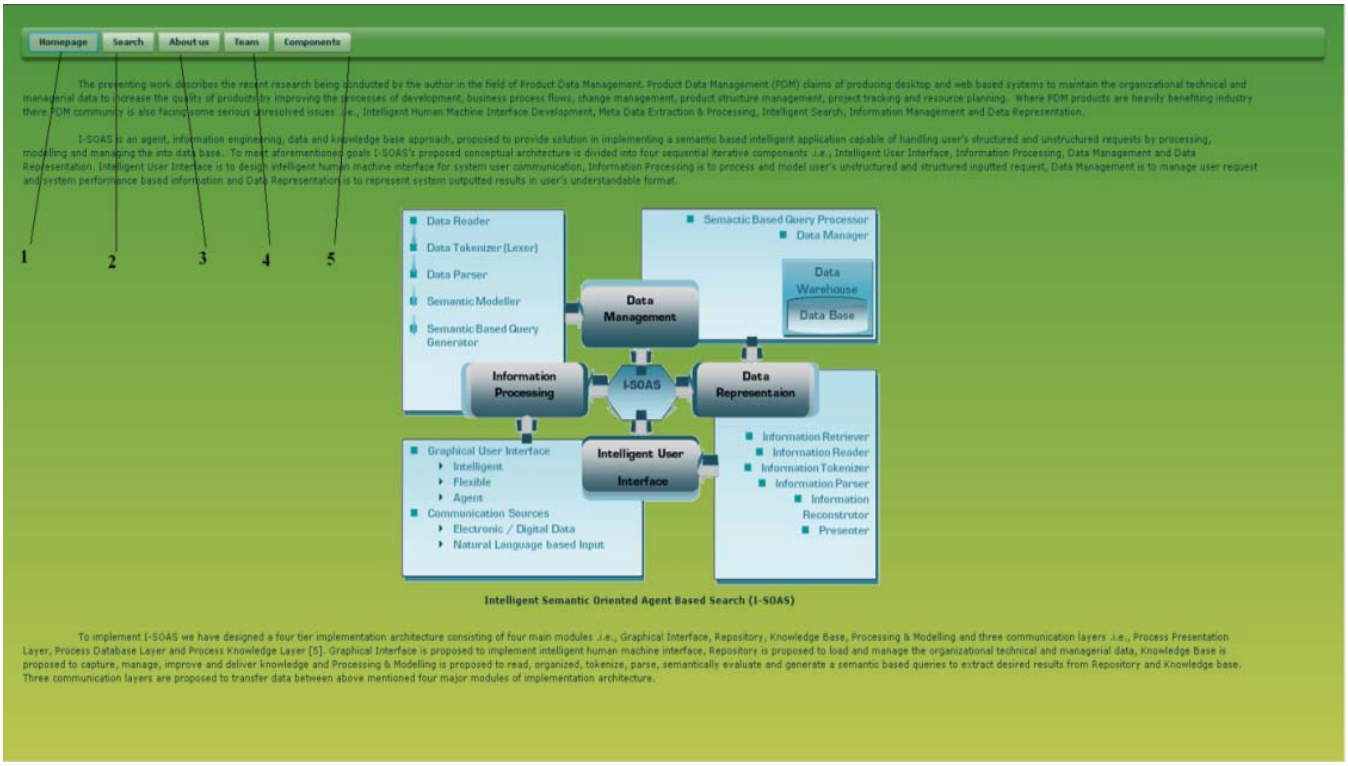

Figure 13. Main Page

No	Option	Description
1	Homepage	Link to the main page of application, providing links to other pages and information about the project I-SOAS.
2	Search	Link to the Search page of application. Moreover search page also contains the secure login system to register new user, authenticate and verify the old user.
3	About Us	Link to the About US page of application, providing the information about Contacts.
4	Team	Link to the Team page of application, providing the information about team involved during the project.
5	Components	Link to the Component page of application.

Table 11. Main Page

This page can be accessed using link Components, divided into two sections: Default Graphical Interface and User Graphical Interface. The default graphical interface (Figure 14) is the interface with some limited and basic options which can be accessed by the user and the guest whereas the user graphical interface can only be accessed by the user after logging into the application with authenticated user name and password (Figure 15).

User graphical interface is the actual interface presenting the prototype definition of proposed idea about Intelligent Graphical Interface of I-SOAS conceptual design and resultant implementation of designed Draft Graphical Interface deigns of I-SOAS implementation design (Table 12). Meeting the design requirements of Draft Graphical Interface, this implemented prototype version of I-SOAS Graphical Interface is flexible and capable of

o Providing standard graphical interface, designed by system

o Providing flexible graphical user interface, so the user can redesign and reconfigure the interface itself to accommodate

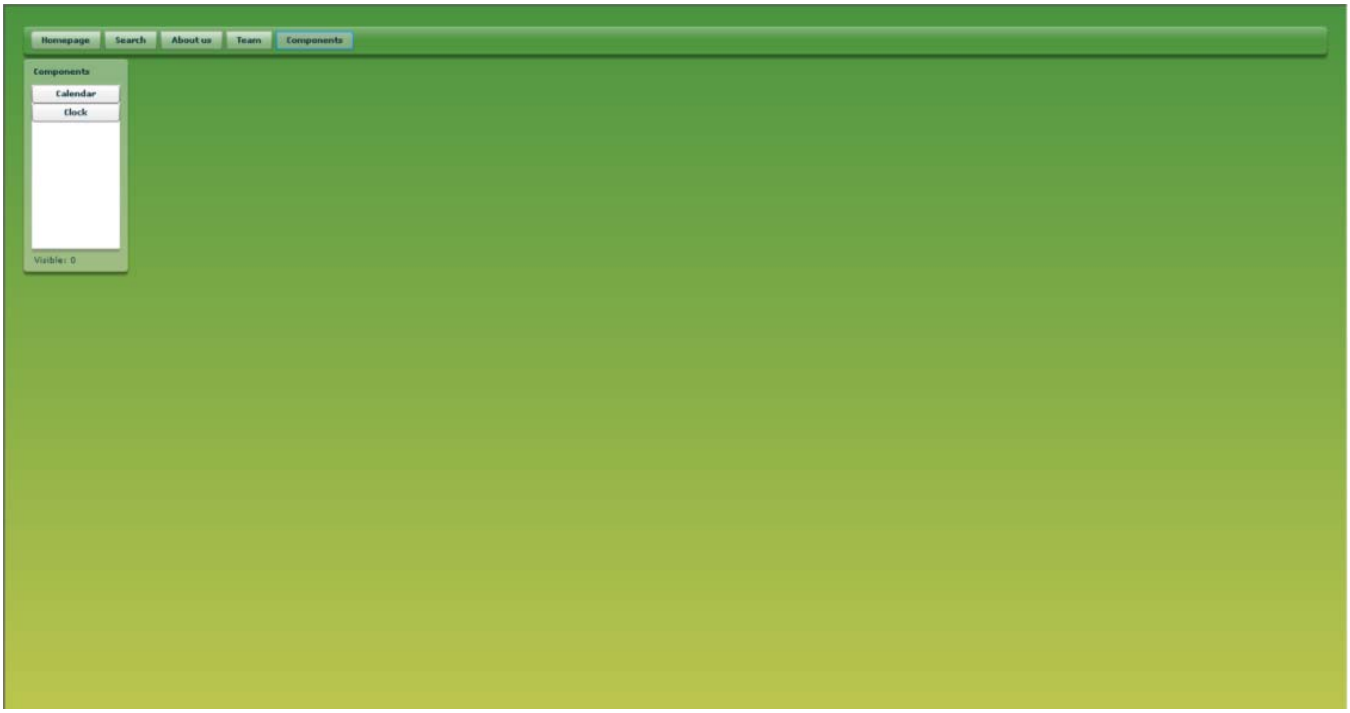

Figure 14. Default Graphical Interface – Without User login

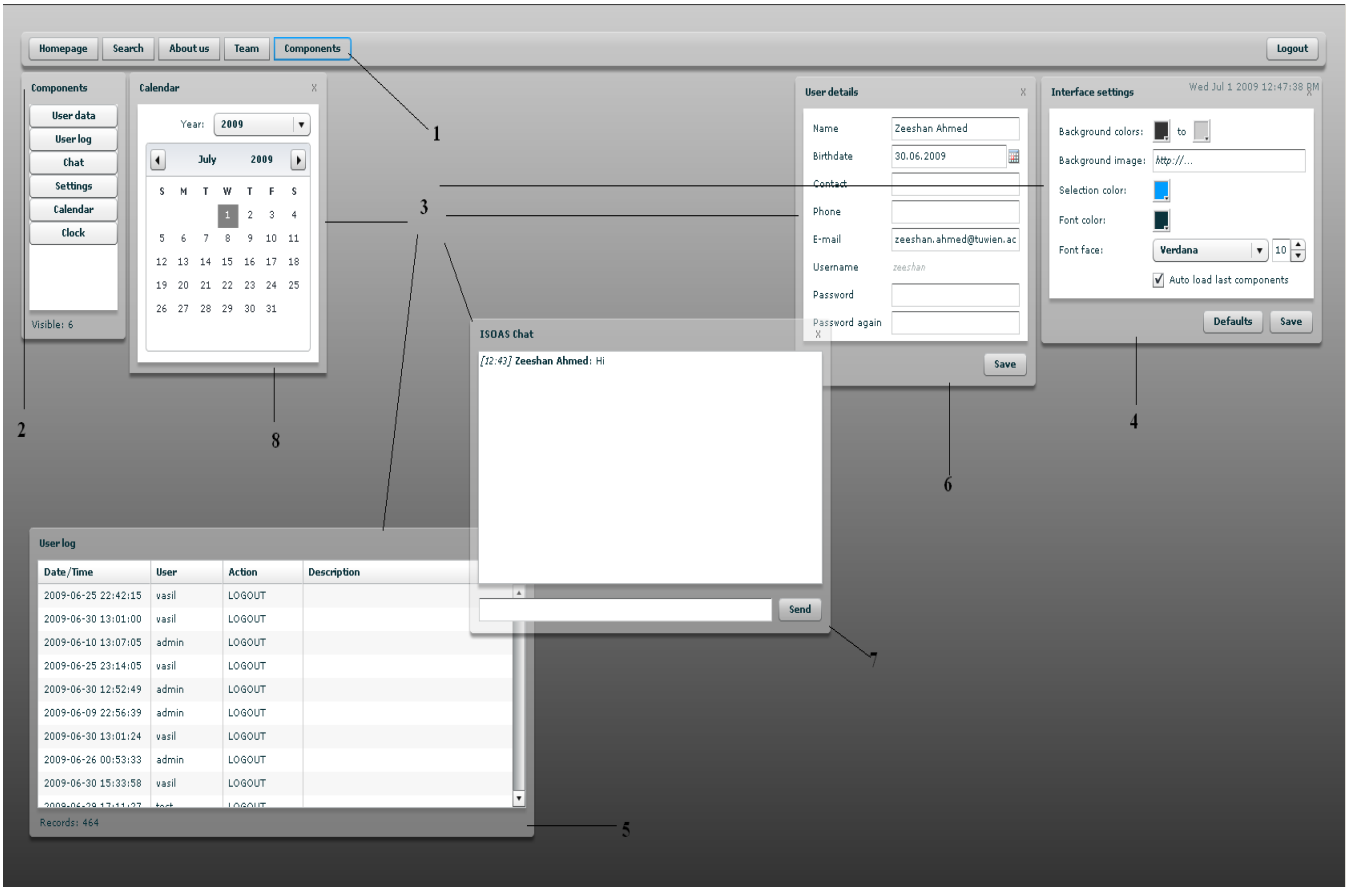

Figure 15. Graphical Interface –After User login

specific needs by Mouse Click and Drag Drop options

o Providing several different options to the user for GUI designing like user can change the look and feel by

- o changing background,
- o changing mixing background colors,
- o changing font colors,
- o changing background text colors,
- o adding some image at the background,
- o adding components from main component bar,
- o deleting added components to the interface
- o altering the placement positions
- o Providing option to every user to save his own deigned GUI, so then next time if user comes online then he will be provided his own designed GUI, not the default one, but he will still have the option to redesign or alter or restore the default GUI.

No	Option	Description
1	Main Component Link	To enable the Graphical Interface.
2	Component Try	Providing all GUI options to the user to click and use.
3	Components	All currently available components.
4	Interface Setting	This component if used to change the outlook of the graphical interface by changing the color schemes and adding or removing image to the main interface.
5	User Log	This component provides the detail of all the operations performed during the use of graphical interface, but this component if only visible to the user with administrative rights.
6	User Details	This component provides the options to enter and alter user details.
7	Chat	This component is providing option for in house chat to the login users to improve in house communications.
8	Calendar	This is the simple calendar to enable user with date.

Table 12. Graphical Interface Page – User Login

Figure 16 presents the search module I-SOAS Web Application. This page can be accessed using Search Link of the main links. Search module is based on both the design requirements of information processing and intelligent user interface of the I-SOAS conceptual architecture (Table 13, Figure 16-17). This implemented version of I-SOAS Search is capable of

o Allowing user to login to make search, because only authenticated user can search

o Providing option to user to enter the instruction in Natural Language as well as SQL Query Format

o Providing Natural Language Mode of search, to enter natural language based query like "*I am looking for PDM*" etc and search

o Providing SQL Query Mode of search, to enter SQL Query like "*Select * from Document "* etc and search

o Providing option to make search after entering the instruction

o Providing results back to the user

o Providing option to log of from the system

3. Conclusions

This manuscript introduces a prototype solution I-SOAS, towards the problems of implementing of an intelligent human machine interface consisting of intelligent user system communication, meta data extraction out of unstructured data, semantic

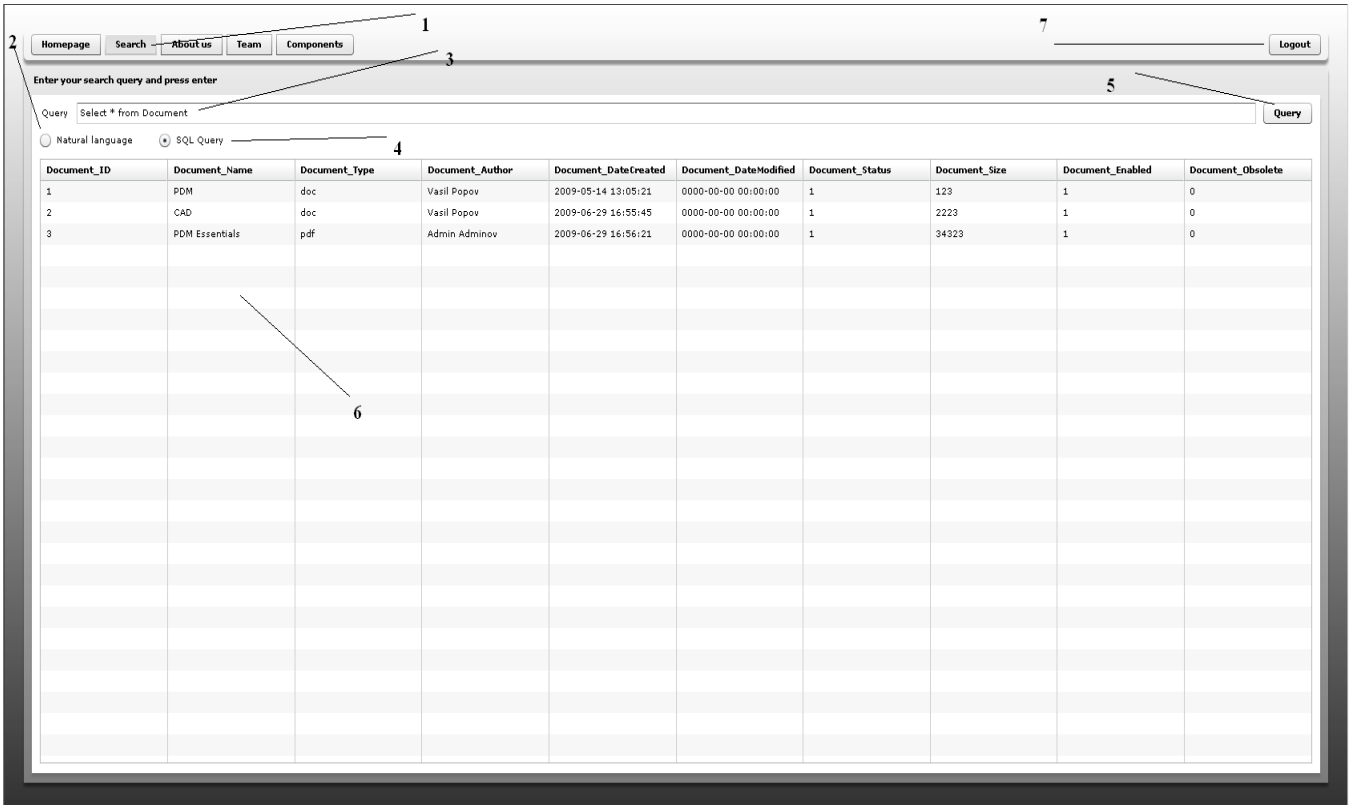

Figure 16. SQL based Search

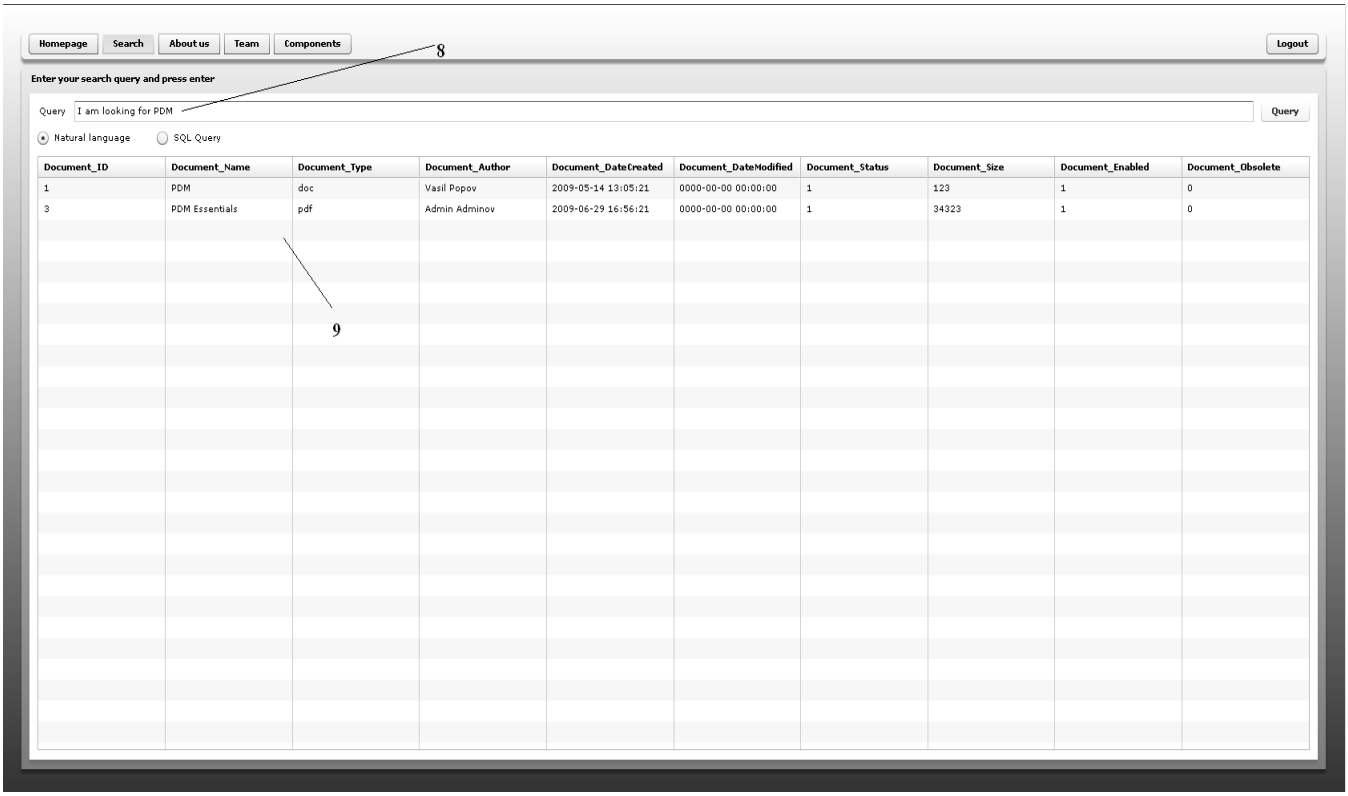

Figure 17. Natural Language based Search

No	Option	Description
1	Search Link	To enable the search.
2	Natural Language	Option to enable natural language based search more write natural language based instruction to search.
3	SQL Query Text	Edit box provided to use to write SQL Query to search.
4	SQL Query	Option to enable SQL based search more write natural language based instruction to search.
5	Query Button	Button to make search.
6	Results	Results are the output of SQL Search.
7	Logout	To logout user.
8	NL Query	Edit box provided to use to write natural language based instruction Query to search.
9	Results	Results are the information extracted using NLP Search.

Table 13. Search Page

oriented information modelling, fast managed data extraction and final user end data representation. With brief approach introduction, this manuscripts elaborates the graphical user interface (both desktop and web) options of I-SOAS.

The presented solution could be considered as the proposition (small prototype) towards the advancement in PDM system development. I-SOAS itself needs to be improved with the addition of (required) more specific PDM components as well as have to to be more efficient in providing semantic based information.

4. Acknowledgement

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Author Biography

Zeeshan Ahmed is (author) is the Scientific Software Engineer at the Department of Bioinformatics, Biocenter, University of Wuerzburg Germany. So far (09/2012): he has been able to work at some interdisciplinary international research projects as researcher and has developed many intelligent software systems as software engineer.

Zeeshan has written many publications including Books, Research Monographs, Book Chapters, Journals Manuscripts, Scientific Transactions, Conference Papers, Workshop Papers, Poster Papers, Scientific Articles, Thesis, Project Reports, Project Manuals and Seminar Papers & Presentations.

He is the Editorial Board Member, Referee of some International journal publishers, and has been offered to be the Session Chair, Program Committee Member, Reviewer and Session Reporter at some International Conferences. He has achieved some distinctions as well as awarded some National and International prizes.

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