

# World War I - Access Enhancement Project #7

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## *Rebaseline Life Cycle Architecture* **System and Software Architecture Description**

University of Southern California  
Center for Software Engineering  
**CSCI 577b**

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# *System and Software Architecture Description*

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## **1. Introduction**

- The purpose of the System and Software Architecture Description document is to provide a feasible architecture for the World War I-Access Enhancement system for the Von KleinSmid Library (OCD).
- This document refers to the Operational Concept Description document (OCD) and the System and Software Requirements Description document (SSRD) for the various responsibilities and requirements.

### ***1.1 Purpose of the System and Software Architecture Description Document***

- The main purpose of this document is to document the architectural analysis and the system design for the World War I – Access Enhancement system (Refer to OCD).
- It provides an insight into the architecture for the proposed system using visual modeling techniques and UML as the formal notation.
- The document also provides a detailed design specification to the developers of this project.
- The document is mainly intended for the architects and the developers of the proposed system i.e. the CS577B team.

### ***1.1 Guidelines***

The following guidelines have been used in the following document:

- Standard UML notations using Rational Rose
- Guidelines for Model-Based Architecture and Software Engineering (MBASE) deliverables – provided in the CS577a class

The following naming convention has been used:

- Objects –AnName
- Classes – NameClass
- Operations – NameOperation()
- Components & Objects – Nouns
- Behaviors & Operations – Verbs

### ***1.2 References***

The following have been referenced by this document

- Operational Concept Description
- System and Software Requirement Description
- Visual Modeling With Rational Rose and UML – Terry Quatrani

- Mastering UML with Rational Rose – Doug Rosenberg
- Inside the UML – Software Development Magazine and Rational Rose Corporation

## 1. Architectural Analysis

The main purpose of this section is to provide an analysis of the proposed World War I –Access Enhancement system and to describe precisely “what” the World War I – Access Enhancement system exactly is. This section consists of the Component Model, Behavior Model and the Enterprise Model.

### 2.1 Component Model

This model is used for identifying the components that are a part of the World War I-Access Enhancement System. It involves the architectural decomposition of the target system into functional parts.

The components identified from the Entity Model of the Operational Concept Description (OCD 2.4) are:

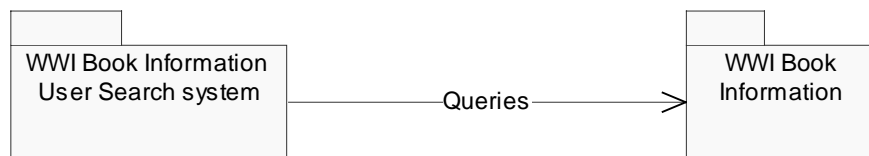
- WWI Book Information User Search System
- WWI Book Information Administrator System
- WWI Book Information Archive
- WWI Book Information
- WWI Archive Administrator

This section provides a higher level architectural description of the system and describes the relationships between the components identified above.

#### 2.1.1 WWI Book Information User Search System

Component	:	COMP-01
Defining Quality	:	The search system interfaces between the user and the database that he/she intends to search through. It translates queries posed by the user into searches on the database and outputs appropriate results.
Name	:	WWI Book Information User Search system
Attributes	:	a) Search Options                      b) Types of search
Behaviors	:	<ul style="list-style-type: none"> <li>☞ Get Results of Query</li> <li>☞ Display specific details of WWI Book</li> <li>☞ Allows the user to communicate with the librarian</li> <li>☞ Provide help to the user</li> </ul>
Relationships (see figure below)	:	☞ WWI Book Information Archive
Roles	:	<ul style="list-style-type: none"> <li>☞ Search Engine</li> <li>☞ Search through database for query</li> </ul>

	☞ Archive Access Interface
	☞ Access specific information on WWI Book
State Groups	: ☞ Access {Accessed, not accessed}
	☞ Search {searching, not searching}
Constraints	: Dependencies : Works on a Java-enabled browser
	Candidate Key :
	Cardinality : *..* relationship with the user
	*..1 relationship with the WWI Book Information Archive
	Others :
Relates To	: Part of Entity E-02 from the entity model (OCD 2.4.3)



**Figure 01: WWI Book Information User Search system**

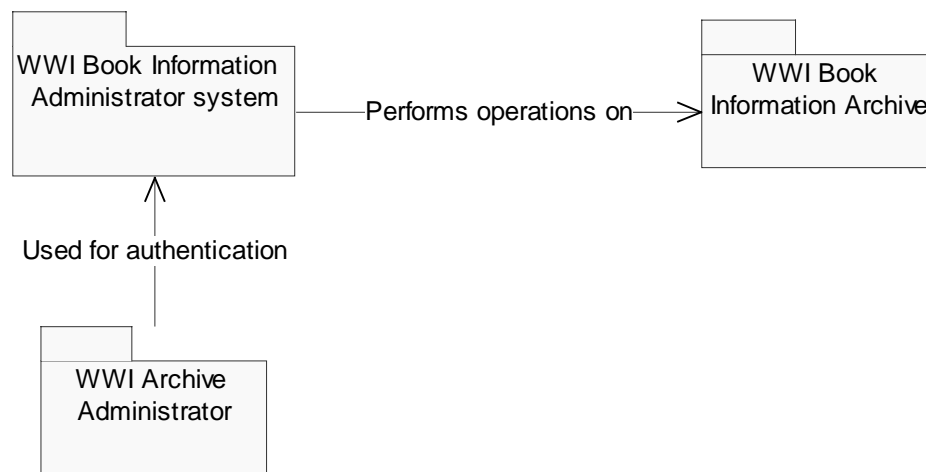
### ***Relationship - R1***

Defining Quality	The search subsystem queries the archive, which returns search results.
Name	Queries
Accessibility	Readable
Scope	Shared
Dependencies	WWI Book Information Archive
Role Names	Query Type {Search, View}

### ***2.1.2 WWI Book Information Administrator System***

Component	: COMP-02
Defining Quality	: A system via which the administrator will be able to maintain the WWI Book Information Archive as well as provide security for the WWI Book Information Archive.
Name	: WWI Book Information Administrator system
Attributes	:
Behaviors	: ☞ Addition of information of new books
	☞ Modification of information of the books
	☞ Deletion of information of the books
	☞ Generation of reports on the information
Relationships	: ☞ WWI Archive Administrator
(see figure below)	☞ WWI Book Information Archive

Roles	:	☞ System by which the administrator maintains and administers the WWI Book Information Archive
State Groups	:	☞ Usage {In use, not in use}
Constraints	:	Dependencies : Can be used on by means of a valid password
		Candidate Key :
		Cardinality : 1..1 relationship with WWI Book Information Archive
		1..1 relationship with the WWI Archive Administrator
		Others :
Relates To	:	Part of Entity E-02 from the entity model (OCD 2.4.3)

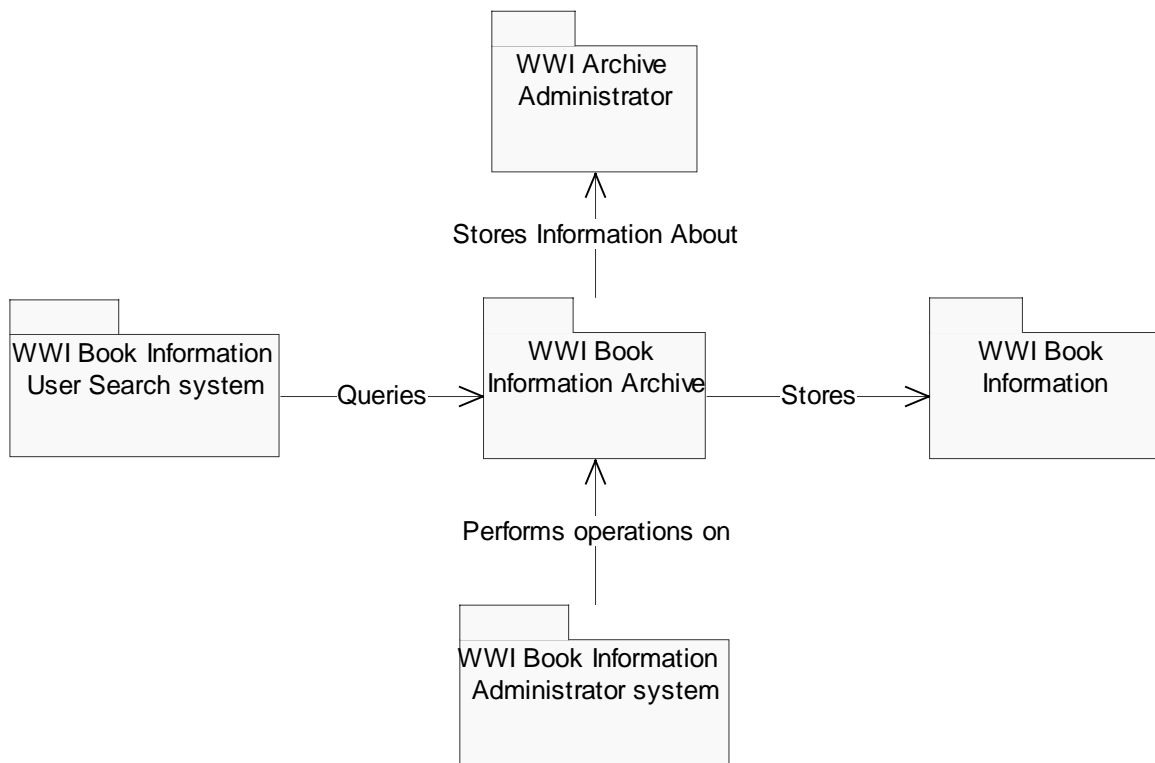


**Figure 02: WWI Book Information Administrator system**

### 2.1.3 WWI Book Information Archive

Component	:	COMP-03
Defining Quality	:	The Archive contains electronic information about WWI Books in the Von Klein Library that have been removed from the stacks for lack of space.
Name	:	WWI Book Information Archive
Attributes	:	☞ Name                                   ☞ Number of fields ☞ Size                                     ☞ Records ☞ Data Types
Behaviors	:	Stores WWI Book Information Stores WWI Archive Administrator information Retrieves the WWI Book Information Searches WWI Book Information Items
Relationships	:	☞ WWI Book Information

(see figure below)	↻ WWI Archive Administrator
	↻ WWI Book Information Search User system
	↻ WWI Book Information Administrator system
Roles	: ↻ Archival Role
	↻ Authenticator
State Groups	: ↻ Access state {Accessible, Under maintenance}
Constraints	: Dependencies : Administrator Information WWI Book Information
	Candidate Key : Call Number
	Cardinality : 1..* relationship with WWI Book Information
	1..* relationship with WWI Book Information User Search system
	1..1 relationship with WWI Archive Administrator
	Others : a) Can be modified only by the Administrator
Relates To	: Part of Entity E-02 from the entity model (OCD 2.4.3)



**Figure 03: WWI Book Information Archive**

**Relationship R-2**

Defining Quality	The Archive stores the Book Information Items that the Administrator has direct control on for updating.
Name	Stores
Accessibility	Readable
Scope	Shared
Dependencies	WWI Book Information Archive WWI Book Information Administrator

**2.1.4 WWI Book Information**

Component	: COMP-04								
Defining Quality	: This component contains information pertaining to WWI Books that have been archived.								
Name	: WWI Book Information								
Attributes	: <table style="display: inline-table; vertical-align: middle;"> <tr> <td>☞ Title</td> <td>☞ Index</td> </tr> <tr> <td>☞ Table of Contents</td> <td>☞ Picture List</td> </tr> <tr> <td>☞ Abstract</td> <td>☞ Call Number</td> </tr> </table>	☞ Title	☞ Index	☞ Table of Contents	☞ Picture List	☞ Abstract	☞ Call Number		
☞ Title	☞ Index								
☞ Table of Contents	☞ Picture List								
☞ Abstract	☞ Call Number								
Behaviors	: <ul style="list-style-type: none"> <li>☞ Retrieve image for viewing</li> <li>☞ Retrieve title and other information</li> </ul>								
Relationships (see figure below)	: ☞ WWI Book Information Archive								
Roles	: ☞ Access State {Being Modified, Accessible for search, Under maintenance}								
State Groups	: ☞ Access state {Accessible, Under maintenance}								
Constraints	: <table style="display: inline-table; vertical-align: middle;"> <tr> <td>Dependencies</td> <td>:</td> </tr> <tr> <td>Candidate Key</td> <td>:</td> </tr> <tr> <td>Cardinality</td> <td>: *.1 relationship with the WWI Book Information Archive</td> </tr> <tr> <td>Others</td> <td>:</td> </tr> </table>	Dependencies	:	Candidate Key	:	Cardinality	: *.1 relationship with the WWI Book Information Archive	Others	:
Dependencies	:								
Candidate Key	:								
Cardinality	: *.1 relationship with the WWI Book Information Archive								
Others	:								
Relates To	: Part of Entity E-02 from the entity model (OCD 2.4.3)								

**Figure 04: WWI Book Information**

**Attribute A-01**

<i>Defining Quality</i>	Consists of searchable text obtained by extracting text from scanned table of contents of WWI Book.	
<i>Name</i>	Table of Contents	
<i>Accessibility</i>	{Settable, Modifiable}	
<i>Scope</i>	Unique	
<i>Dependencies</i>	<i>Derived from</i>	WWI Archive

**Attribute – A-02**

<i>Defining Quality</i>	A gist of the contents of the WWI Book which can be searched from.	
<i>Name</i>	Abstract	
<i>Accessibility</i>	{Readable, Settable, Modifiable}	
<i>Scope</i>	Unique	
<i>Dependencies</i>	<i>Derived from</i>	WWI Archive

**Attribute – A-03**

<i>Defining Quality</i>	An index of keywords from the book	
<i>Name</i>	Index	
<i>Accessibility</i>	{Readable, Settable, Modifiable}	
<i>Scope</i>	Unique	
<i>Dependencies</i>	<i>Derived from</i>	WWI Archive

**Attribute – A-04**

<i>Defining Quality</i>	List of images scanned from the WWI Book which can be retrieved for viewing by the Search subsystem.	
<i>Name</i>	Picture List	
<i>Accessibility</i>	{Readable, Settable, Modifiable}	
<i>Scope</i>	Unique	
<i>Dependencies</i>	<i>Derived from</i>	WWI Archive

**Attribute – A-05**

<i>Defining Quality</i>	Call number of the WWI Book that is unique for each of them.	
<i>Name</i>	Call number	
<i>Accessibility</i>	{Readable}	
<i>Scope</i>	Unique	
<i>Dependencies</i>	<i>Derived from</i>	WWI Archive

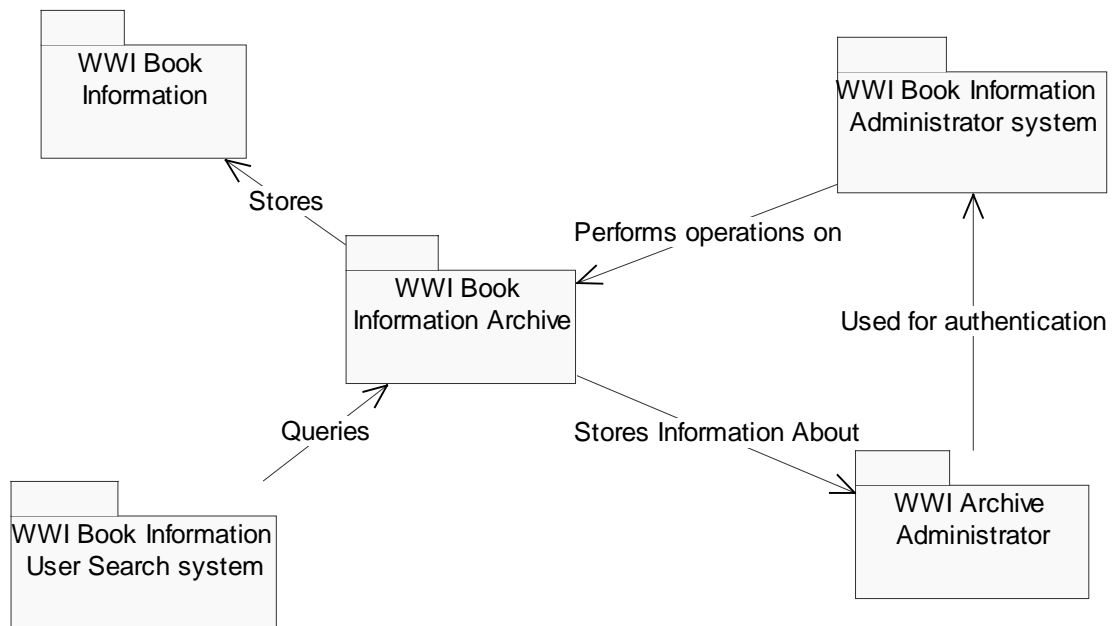


**Relationship R-3**

Defining Quality	The Archive maintains some information about the administrator for authorization purposes.
Name	Stores info about
Accessibility	Readable
Scope	Shared
Dependencies	WWI Book Information Archive WWI Book Information Administrator

**Relationship R-4**

Defining Quality	The Administrative subsystem controls updating and modification of the archive
Name	Updates
Accessibility	{Readable, Settable, Modifiable}
Scope	Shared
Dependencies	WWI Book Information Archive

**Figure 06: Overall Component Model**

## 2.2 Behavior Model

The main purpose of the behavior model is to describe how the system will behave with the help of scenarios and use cases. The behaviors are consistent with the Organization Activity Model (OCD 2.5) and the System Responsibilities (OCD 3.3).

The proposed system consists of two sub-systems:

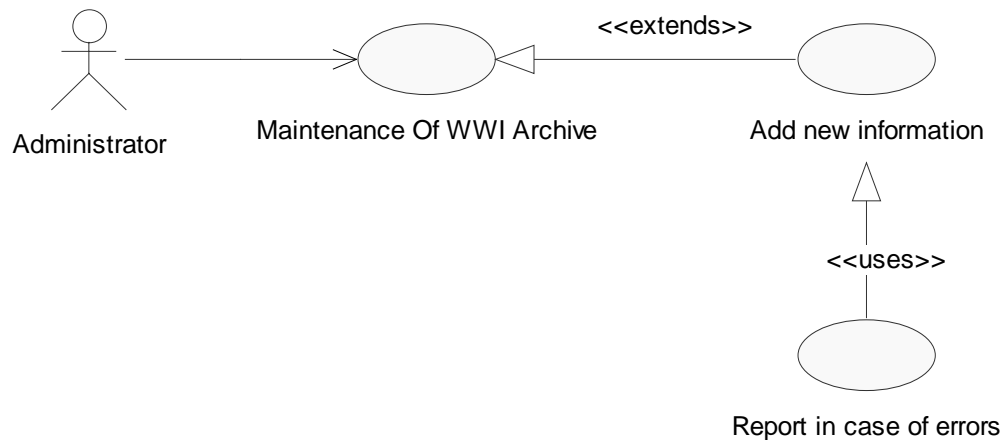
- ☞ WWI Book Information Administrator system
- ☞ WWI Book Information User Search system

### 2.2.1 Behavior Model for the WWI Book Information Administrator System

- ☞ Maintenance of Information (SRES-02 OCD 3.3.1)
  - Add new information (SRES-02 OCD 3.3.1)
  - Modify existing information (SRES-02 OCD 3.3.1)
  - Delete existing information (SRES-02 OCD 3.3.1)
- ☞ Get Help on using the application (SRES –03 OCD 3.3.1)
- ☞ User Authentication (SRES-01 OCD 3.3.1)

#### 2.2.1.1 Add new information

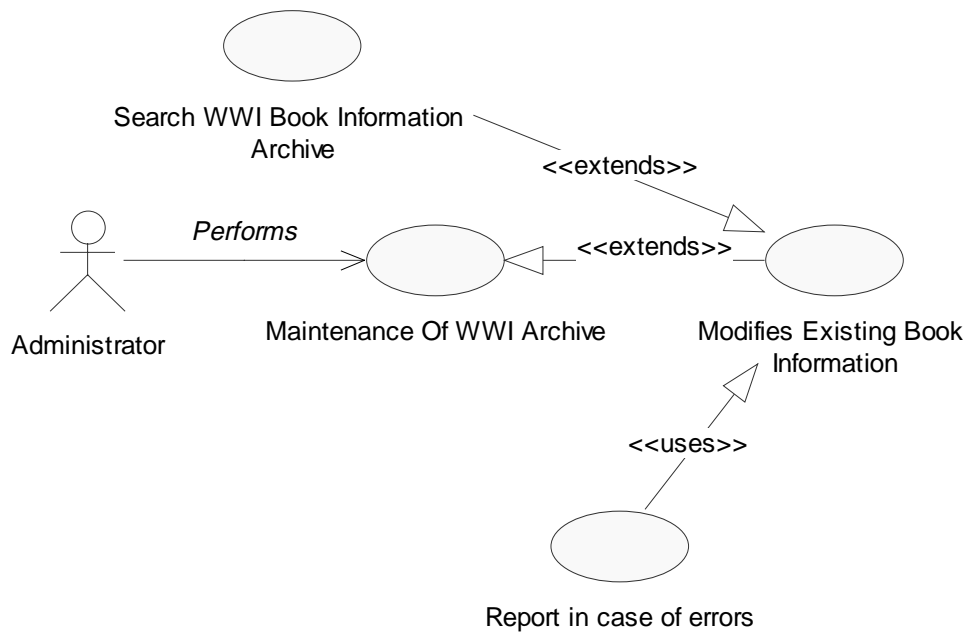
Behavior	:	BEHV-01
Trigger	:	Selection of add option from the add screen
Description	:	Allows the administrator to add records in the WWI Book Information Archive, which would contain the information about the World War I books. This would include certain details like the name of the author, name of the book, table of contents, abstract, call number, and the imprint
Pre-Conditions	:	<ul style="list-style-type: none"> <li>☞ Administrator must have been validated</li> <li>☞ Option of add records has been selected</li> </ul>
Post-Conditions	:	A new record containing information about the World War I book is added to the WWI Book Information Archive
Input(s)	:	<ul style="list-style-type: none"> <li>☞ Title</li> <li>☞ Author(s)</li> <li>☞ Table of Contents</li> <li>☞ Call number</li> <li>☞ Abstract</li> <li>☞ Imprint</li> <li>☞ Images</li> </ul>
Constraints	:	<ul style="list-style-type: none"> <li>☞ The call number has to be unique</li> <li>☞ The title has to be entered</li> <li>☞ This operation can be performed only by the administrator</li> </ul>
Dependencies	:	
Outputs	:	A new entry in the WWI Book Information Archive
Exceptions	:	
Relates To	:	System responsibility SRES-02
Scenario	:	See figure below



**Figure 07: Addition of records in the WWI Book Information Archive**

#### 2.2.1.2 Modify existing information

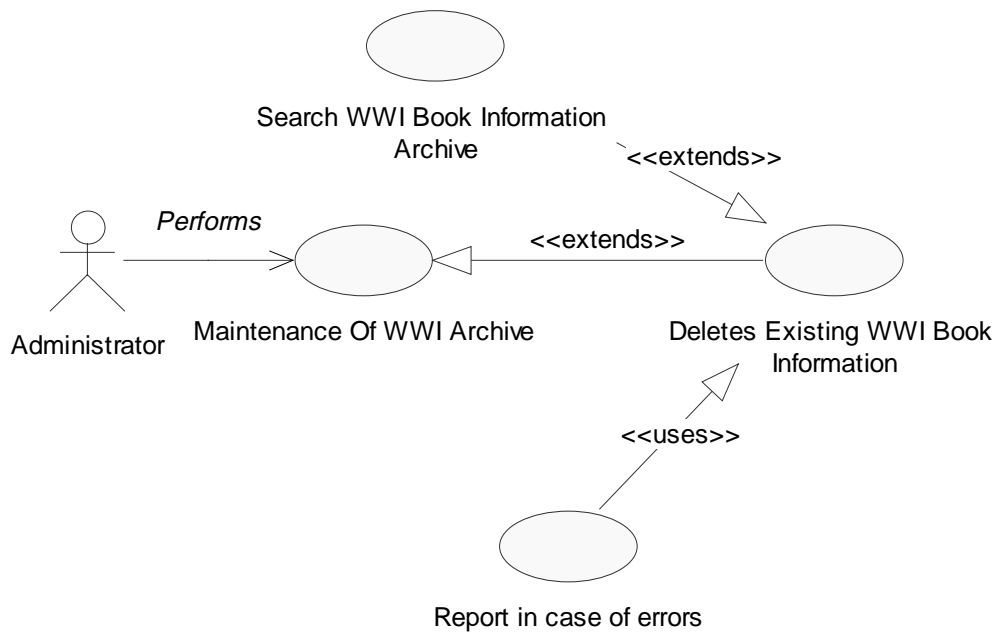
Behavior	: BEHV-02
Trigger	: Selection of modify option from the modify screen
Description	: Allows the administrator to modify existing records in the WWI Book Information Archive.
Pre-Conditions	: <ul style="list-style-type: none"> <li>☞ Administrator must have been validated</li> <li>☞ Option of modify records has been selected</li> <li>☞ The information to be modified must be present in the WWI Book Information Archive</li> </ul>
Post-Conditions	: A modified record about the World War I book is now present in the WWI Book Information Archive
Input(s)	: <ul style="list-style-type: none"> <li style="width: 50%;">☞ Title</li> <li style="width: 50%;">☞ Abstract</li> <li style="width: 50%;">☞ Author(s)</li> <li style="width: 50%;">☞ Imprint</li> <li style="width: 50%;">☞ Table of Contents</li> <li style="width: 50%;">☞ Images</li> <li style="width: 50%;">☞ Call number</li> </ul>
Constraints	: <ul style="list-style-type: none"> <li>☞ The call number cannot be modified</li> <li>☞ This operation can be performed only by the administrator</li> </ul>
Dependencies	: ☞ This behavior depends on the existence of some information in the WWI Book Information Archive
Outputs	: A modified entry in the WWI Book Information Archive
Exceptions	:
Relates To	: System responsibility SRES-02
Scenario	: See figure below



**Figure 08: Modification of existing records in the WWI Book Information Archive**

### 2.2.1.3 Delete existing information

Behavior	: BEHV-03
Trigger	: Selection of delete records option delete screen
Description	: Allows the administrator to delete existing records in the WWI Book Information Archive.
Pre-Conditions	: <ul style="list-style-type: none"> <li>☞ Administrator must have been validated</li> <li>☞ Option of delete records has been selected</li> <li>☞ The information to be deleted must be present in the WWI Book Information Archive</li> </ul>
Post-Conditions	: An updated WWI Book Information Archive
Input(s)	: <ul style="list-style-type: none"> <li>☞ a) Call number</li> <li>☞ b) Title</li> </ul>
Constraints	: <ul style="list-style-type: none"> <li>☞ a) This action can be performed only by the administrator</li> </ul>
Dependencies	: <ul style="list-style-type: none"> <li>☞ This behavior depends on the existence of some information in the WWI Book Information Archive</li> </ul>
Outputs	: A record is deleted from the WWI Book Information Archive
Exceptions	:
Relates To	: System responsibility SRES-02
Scenario	: See figure below




**Figure 09: Deletion of existing records in the WWI Book Information Archive**

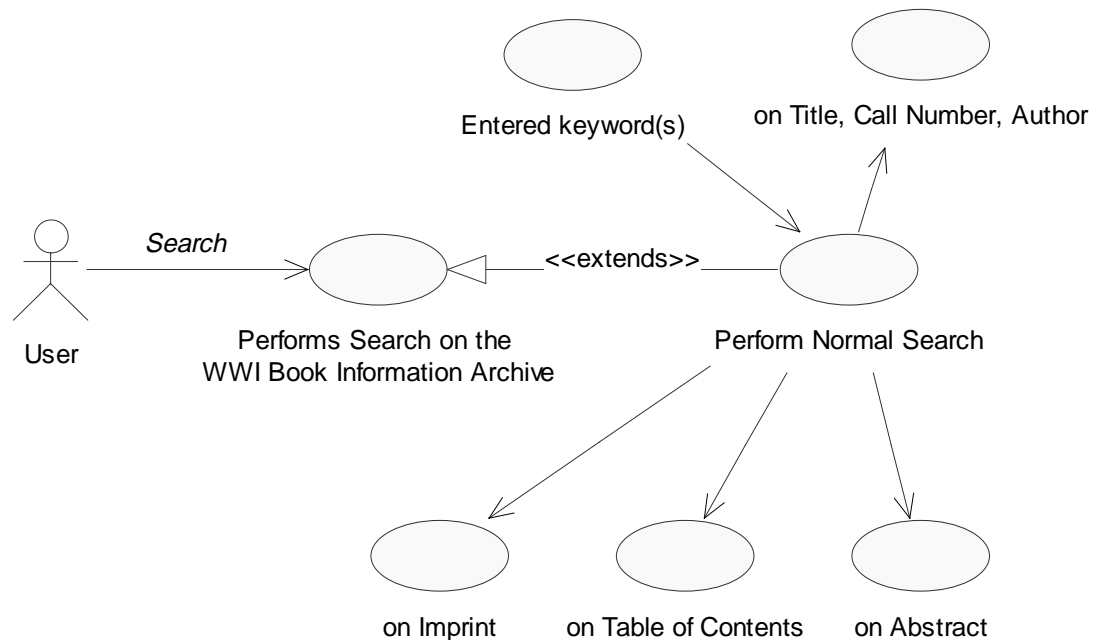
#### 2.2.1.4 Get Help on using the application

Behavior	: BEHV-04
Trigger	: Selection of Help option from the main menu or any other screens of the application
Description	: Provides the administrator with a detailed help information about the application and that particular screen
Pre-Conditions	: <ul style="list-style-type: none"> <li>☞ Administrator must have been validated</li> <li>☞ Option of Help has been selected</li> </ul>
Post-Conditions	: A report on the information in the WWI Information Archive is generated which can viewed or printed
Input(s)	:
Constraints	:
Dependencies	:
Outputs	: A screen displaying detailed help on the application and the screen from which the option was selected.
Exceptions	:
Relates To	: System responsibility SRES-03



### 2.2.2.1 Perform normal Search of the WWI Book Information Archive

Behavior	: BEHV-06
Trigger	: User enters the keyword(s) and selects the search option
Description	: The user would first fill out some text in the textbox which is/are taken as the keyword(s). These keyword(s) will be used to query in each field of the WWI Book Information Archive
Pre-Conditions	:
Post-Conditions	: The results matching the keyword(s) would be displayed to the user
Input(s)	:  Keyword(s)
Constraints	:
Dependencies	: A valid result would be displayed only if the user has entered some keyword(s). An error would be displayed to the user if there are no keyword(s) expected.
Outputs	: The information matching the user's keyword(s) would be displayed
Exceptions	:
Relates To	: System responsibility SRES-04
Scenario	: See figure below

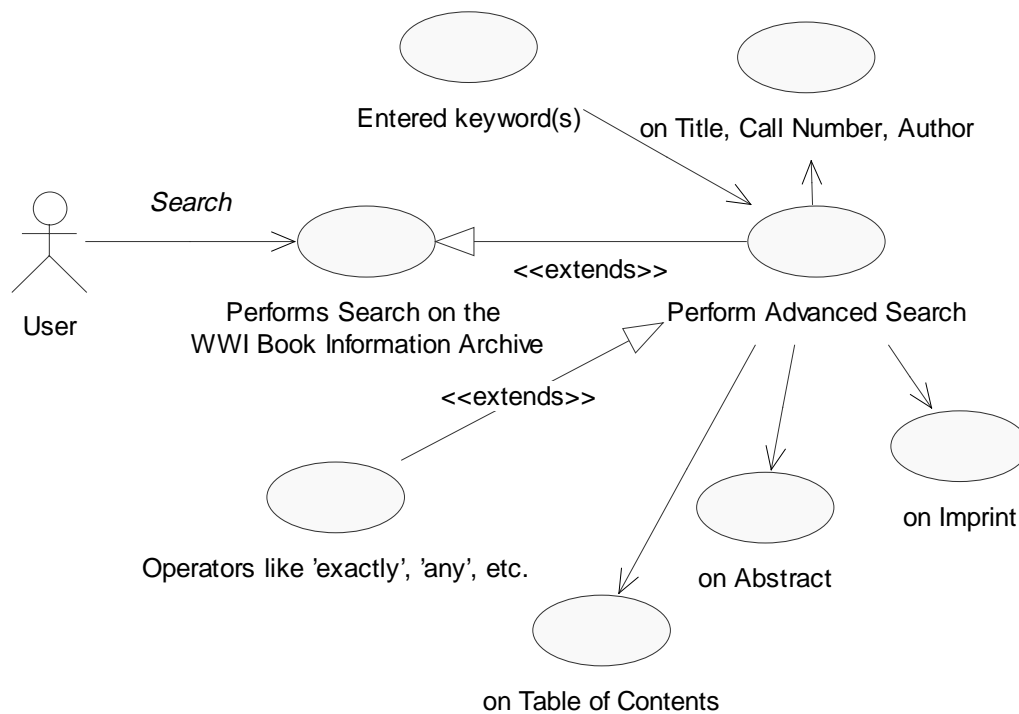


**Figure 12: Perform Normal Search on the WWI Book Information Archive**

### 2.2.2.2 Perform advanced Search of the WWI Book Information Archive


Behavior	: BEHV-07
Trigger	: User selects the advanced search option and enters the keyword(s) in the various textboxes
Description	: The user would first fill out some text in the textbox which is/are

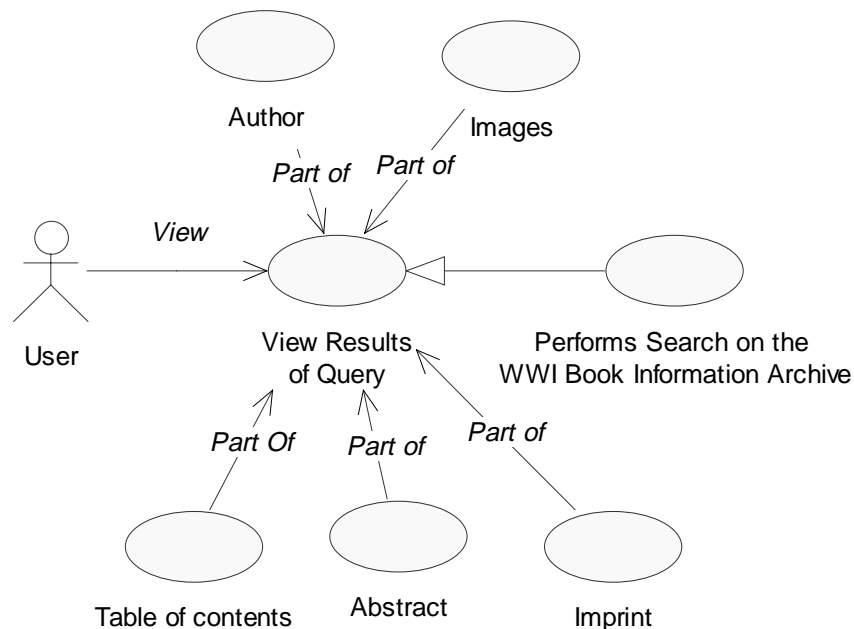
		taken as the keyword(s). These keyword(s) will be used to query in the corresponding field of the WWI Book Information Archive
Pre-Conditions	:	The user must have selected the Advanced Search Option
Post-Conditions	:	The results matching the keyword(s) would be displayed to the user
Input(s)	:	☞ Keyword(s)
Constraints	:	Only the fields for which the keyword(s) has been entered will be searched in the WWI Book Information Archive
Dependencies	:	A valid result would be displayed only if the user has entered some keyword(s). An error would be displayed to the user if there are no keyword(s) entered
Outputs	:	The information matching the user's keyword(s) would be displayed
Exceptions	:	
Relates To	:	System responsibility SRES-04
Scenario	:	See figure below



**Figure 13: Perform Advanced Search on the WWI Book Information Archive**

### 2.2.2.3 View results retrieved from the WWI Book Information Archive

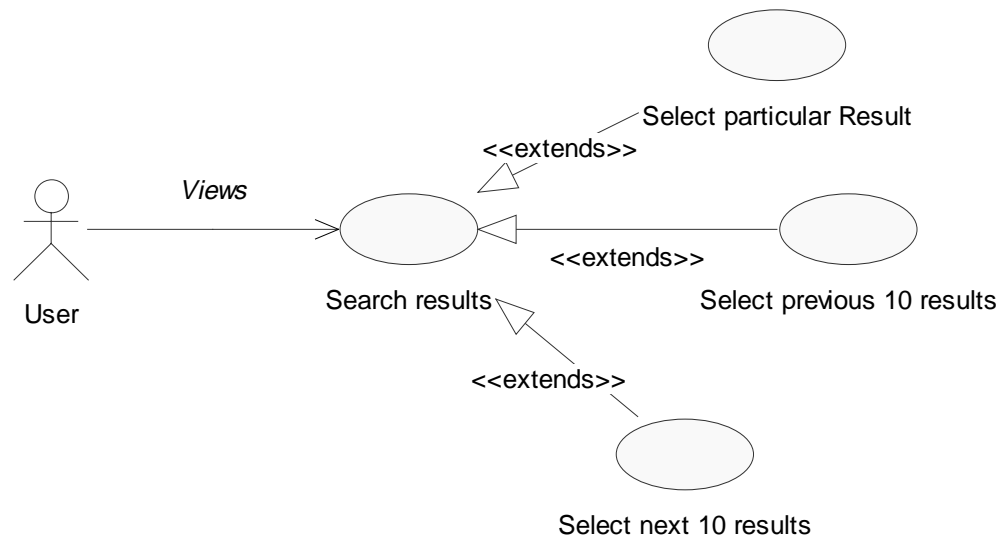
Behavior	: BEHV-08
Trigger	: User selects the search or the advanced search option and enters the keyword(s)
Description	: Depending on the keyword(s) that the user has entered the information if present in the WWI Book Information Archive will be displayed. If there are no matches found or if the user has made any error, appropriate messages will be displayed
Pre-Conditions	: Either the search or the advanced search option has to be selected
Post-Conditions	: The user would be able to view the messages generated
Input(s)	:  Keyword(s)
Constraints	:
Dependencies	:
Outputs	: The table of contents, abstract, imprints, title, author name(s), images, etc matching the keyword(s) would be displayed.
Exceptions	: In case a result is not found, error messages with certain options will be displayed
Relates To	: System responsibility SRES-05
Scenario	: See figure below



**Figure 14: View Results retrieved from the WWI Book Information Archive**

#### 2.2.2.4 Navigate through the results

Behavior	: BEHV-09
Trigger	: Results of user query are obtained from the archive.
Description	: The search results are displayed in a sequence of displayed pages each of which contain a certain number of query results (at most)
Pre-Conditions	: Results have to be fetched from the WWI Book Information Archive and displayed to the user
Post-Conditions	:
Input(s)	: Search Results
Constraints	: Graphical display page
Dependencies	:
Outputs	:
Exceptions	:
Relates To	: System responsibility SRES-05

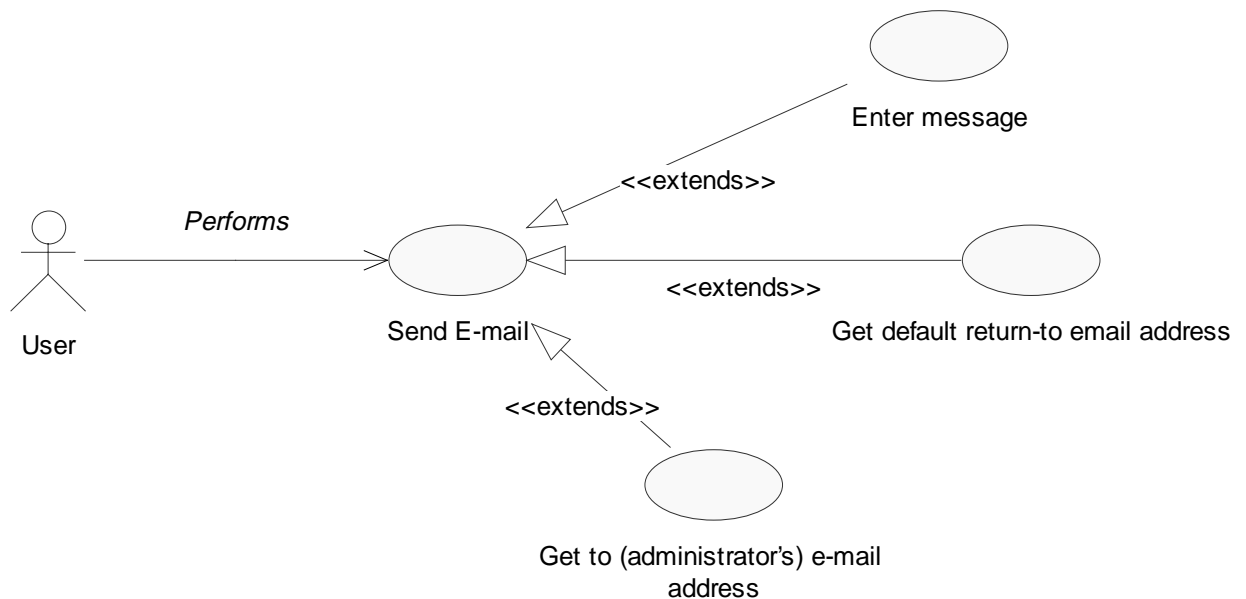


**Figure 15: Navigate through the Results retrieved from the WWI Book Information Archive**

#### 2.2.2.5 Communicate with the librarian

Behavior	: BEHV-10
Trigger	: User selects contact reference librarian option in the application
Description	: When the user selects this option, the e-mail composer application pops up. The "To" field is pre-filled with the library staff's e-mail address. Similarly the "From" is pre-filled with the user's e-mail address. The user fills up the "Subject" field with the subject of inquiry and then types the body of the e-mail and sends it.
Pre-Conditions	:
Post-Conditions	: An e-mail which will be read by the reference librarian(s)

Input(s)	: ☞ User's "Subject" Information	☞ User's email message body
Constraints	:	
Dependencies	:	The option of contacting reference librarian has to be selected
Outputs	:	An e-mail is sent to the reference librarian
Exceptions	:	The e-mail composer application pops up. The "To" field is pre-filled with the library staff's e-mail address. Similarly the "From" is pre-filled with the user's e-mail address. The user fills up the "Subject" field with the subject of inquiry and then types the body of the e-mail and sends it.
Relates To	:	System responsibility SRES-06
Scenario	:	See figure below

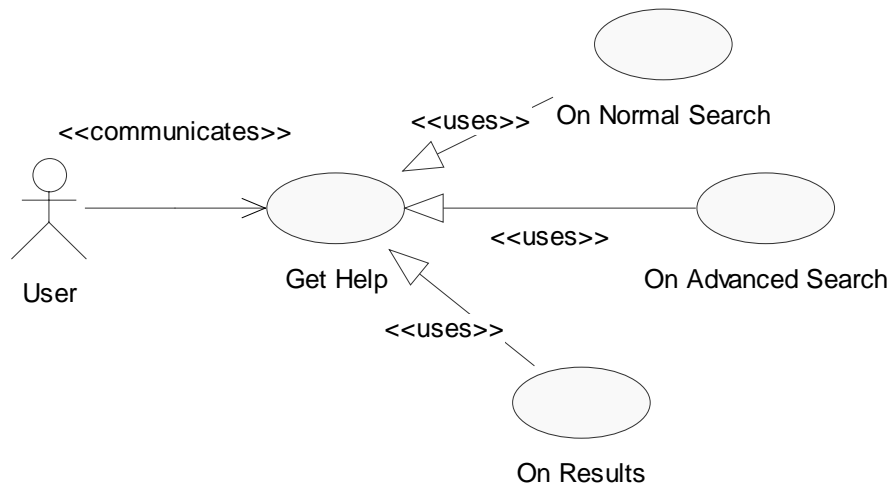


***Figure 16: Communicate with the administrator***

#### 2.2.2.6 Get Help on using the application

Behavior	: BEHV-11
Trigger	: Selection of Help option from any of the web pages of the application
Description	: Provides the user with a detailed help information about the application and hints on passing the right keywords and Boolean operators.
Pre-Conditions	: ☞ Option of Help has been selected
Post-Conditions	: A report on the information in the WWI Information Archive is generated which can viewed or printed

Input(s)	:	
Constraints	:	
Dependencies	:	
Outputs	:	A screen displaying detailed help on the application
Exceptions	:	
Relates To	:	System responsibility SRES-06



**Figure 17: Get Help on various topics**

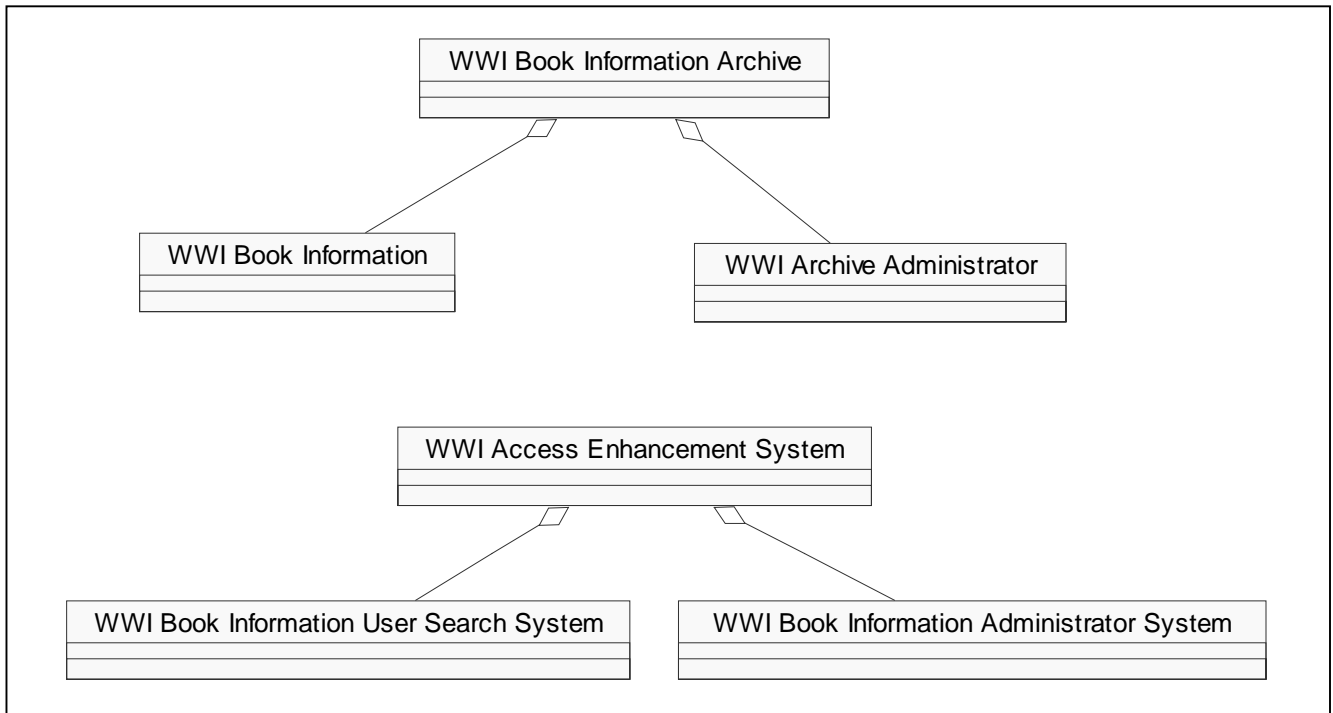
## 2.3 Enterprise Model

The enterprise model presents the top level components and behaviors. The components and the behaviors are decomposed into a tree hierarchy. Also a classification into 'Is-kind-Of' and 'Is-Part-Of' relationships is made in this model. The enterprise model is consistent with the Behavior Model (SSAD 2.2) and the Component Model (SSAD 2.1)

### 2.3.1 Logical Component Classification

The diagrams below show the hierarchy of components that were identified in the component model (SSAD 2.1).

- ✎ The WWI Book Information User Search system and the WWI Book Information Administrator system together form the entire World War I Access Enhancement system.
- ✎ The information about the World War I books and the information about the administrator is stored WWI Book Information Archive

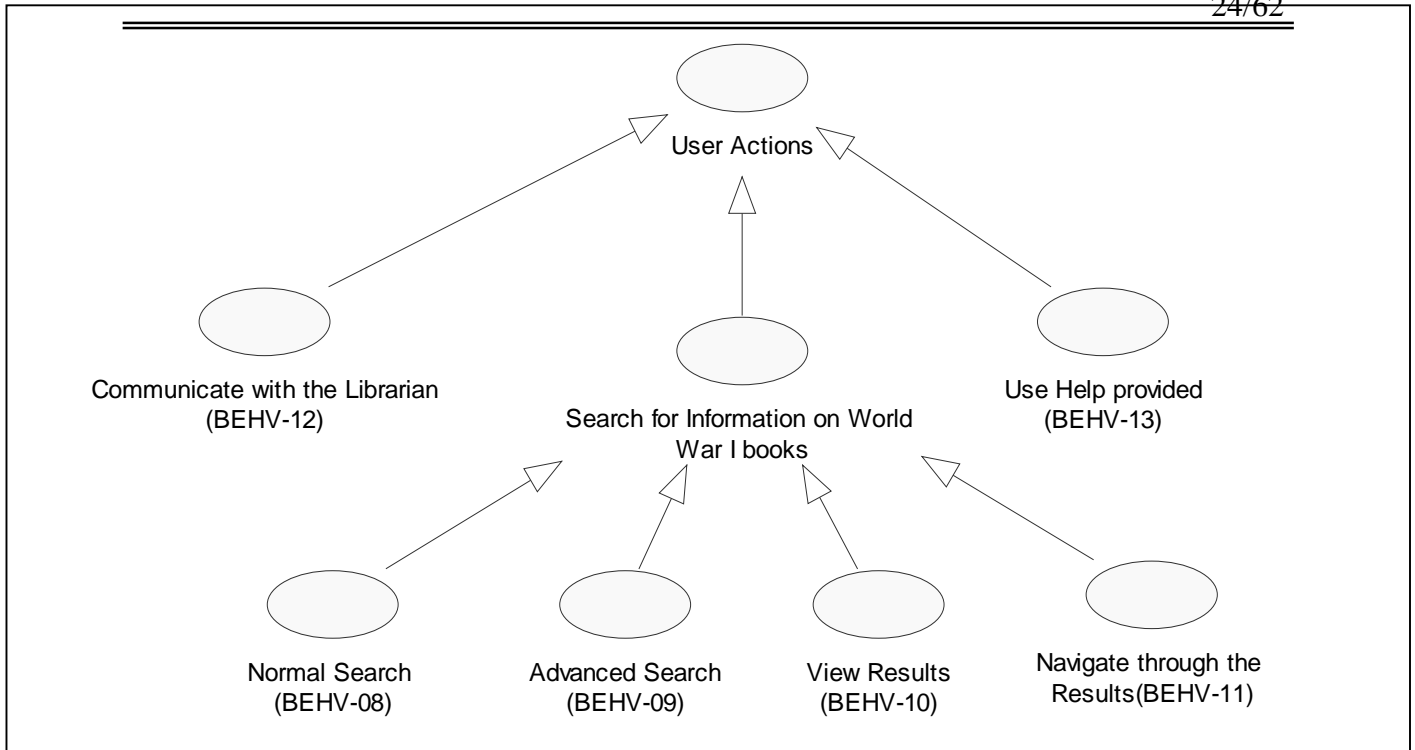


**Figure 18: Logical Component Classification**

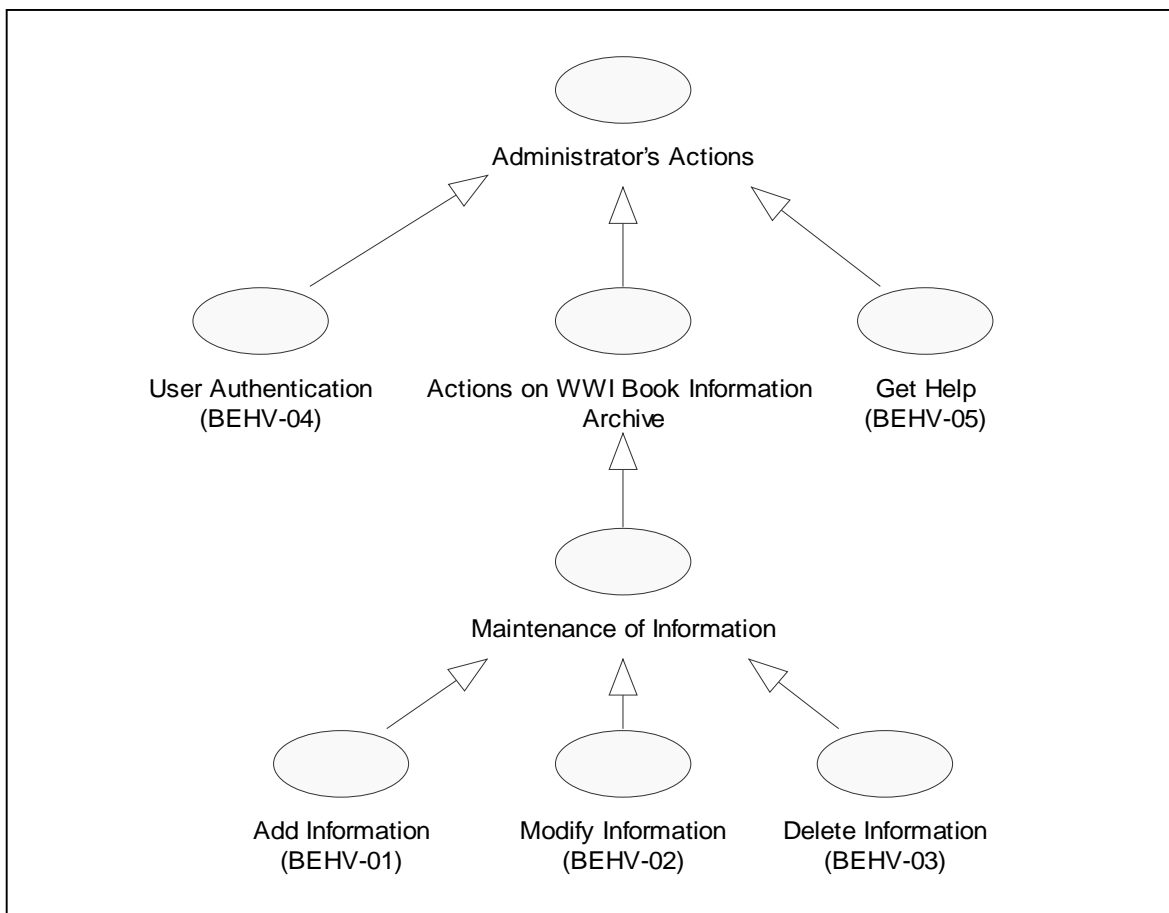
### 2.3.2 Logical Behavior Classification

The diagrams below show the hierarchy of the behaviors identified in the Behavior Model (SSAD 2.2).

- ☞ The behaviors of the administrator can be classified as actions on the WWI Book Information Archive include adding, modifying, deleting records, seeking user authentication and accessing the help provided for using the application. This form a part of the administrator’s behavior along with the behavior of using the help facility provided in the application.
- ☞ The behaviors of the user can be classified as performing different kinds of searches that are a part of the performing search action, communicating with the library staff, viewing and navigating through the results generated after the search operation and using the help provided in the application.



**Figure 19: WWI Book Information User Search System Behavior Classification**



**Figure 20: WWI Book Information Administrator System Behavior Classification**

### 3. System Design

This section will look at the various design views, models, objects, their specifications and sequence diagrams in order to present the proposed system and indicate how the goals, responsibilities and the requirements can be met and achieved. Each diagram clearly shows which Analysis components have been split into software components and which has remained the same

#### 3.1 Design Views

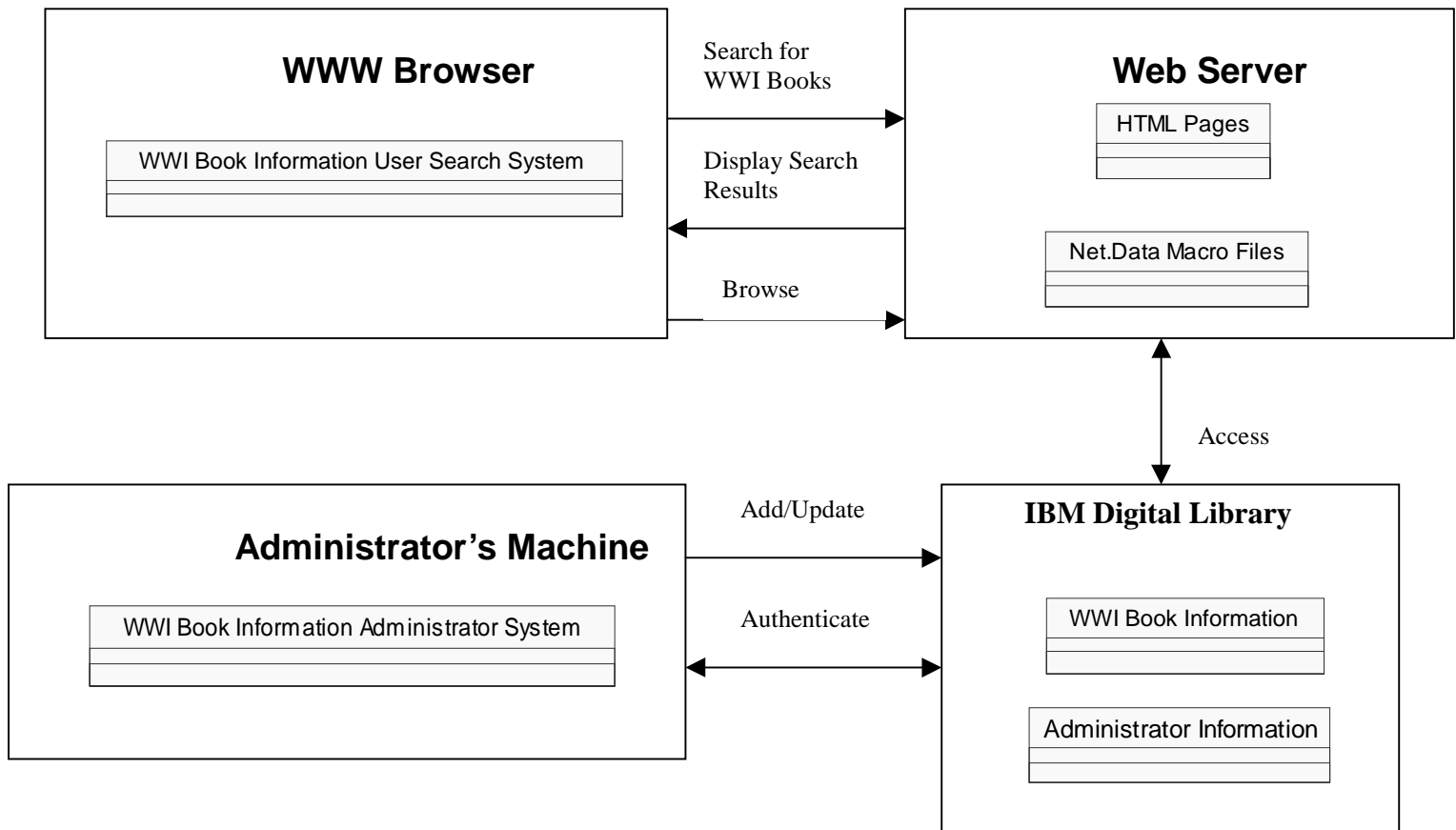
The design views are mainly used to describe how the system components can be mapped into low level architecture. There are three types of views each of them giving a logical, system component and the deployment (actual hardware/software) of the proposed system.

##### 3.1.1 Logical Component View

The main aim of this project is to enhance the access of these World War I books. Which are at present in the VKC library[OCD 4].The primary purpose is to provide a web-based access to the patrons so that they can access this collection from anywhere. Typically, a user of this system would enter a keyword(s). Also, there would be an option for an advanced search in which he user could give the call number, name of the book, author name(s), keyword(s) from the table of contents and abstract. He could also perform a Boolean search on these keywords. The Net.Data script will then take these keywords. The script would run in the Lotus Domino Web server, which would connect with the IBM DB2 Digital library. The database would be searched on the keywords entered by the user and passed on by the Net.Data script. In case of normal search, all the fields in the database would be searched for each record till matching records were found. In case of advanced search, only the fields for which the keyword(s) were entered would be searched till matching records were found. The results would be displayed in the dynamically generated HTML pages. In case of no matching records, a message would be displayed to the user. In addition an option of on-line help would be provided which would contain tips and guidelines as to how the search should be carried out in order to get the best results.

The administrator is primarily responsible for keeping the database updated. He can add, modify, delete record and generate a report on the information present in the database, which would contain information like call number, title, author(s) and imprint. In addition to this, he could also search on the records in the database.

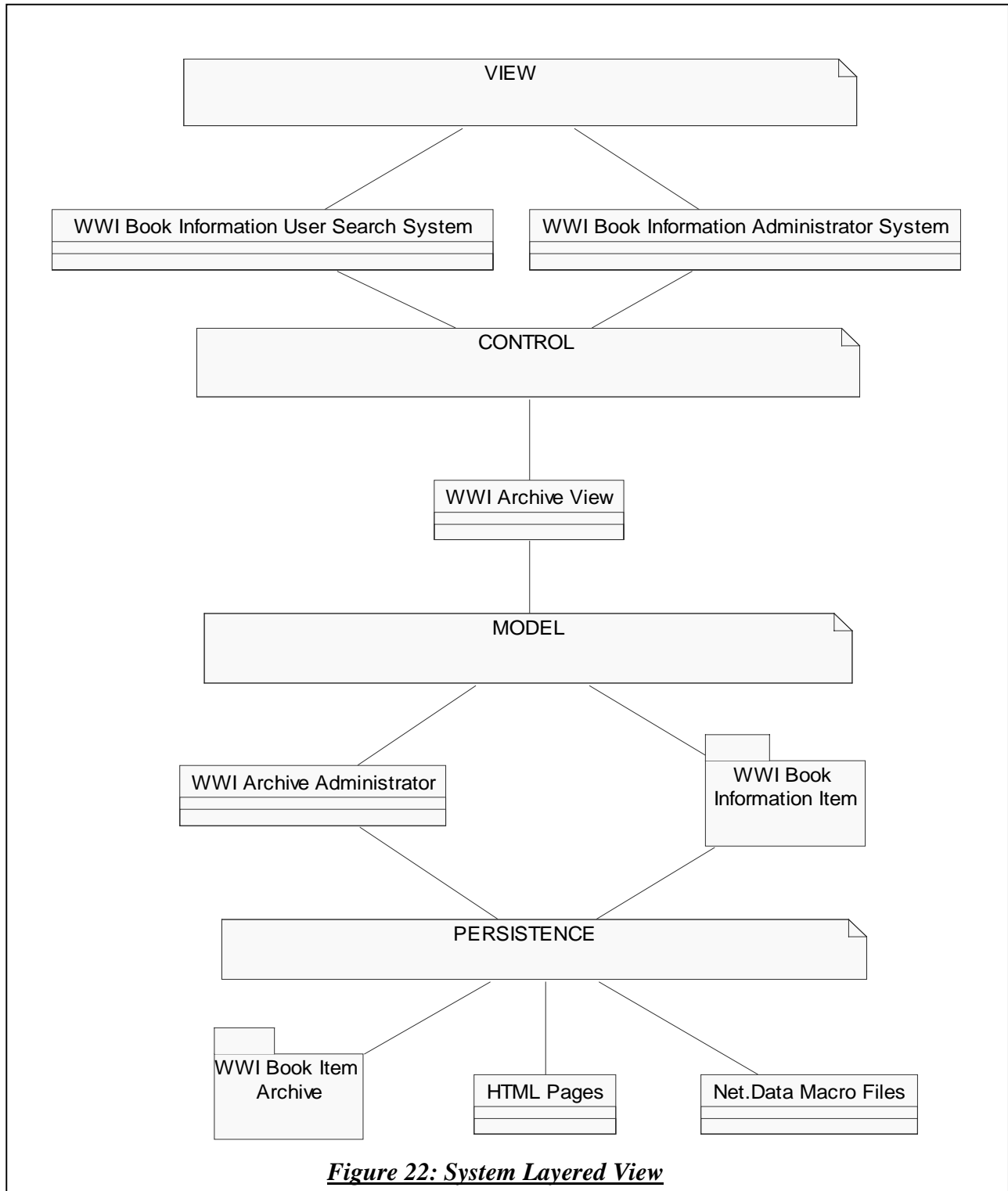
Since the user application would be accessible via the World Wide Web, the user application will mainly consist of static and dynamic generated HTML pages. The administrator's application would be developed in Java using the API provided by IBM DB2 Digital Library.



***Figure 21: Logical Component View***

### 3.1.2 System Layered View

The MVC (Model View Controller) approach has been adopted for the layered view. As shown below the Archive has an Archive view, the model and a controller associated with it.



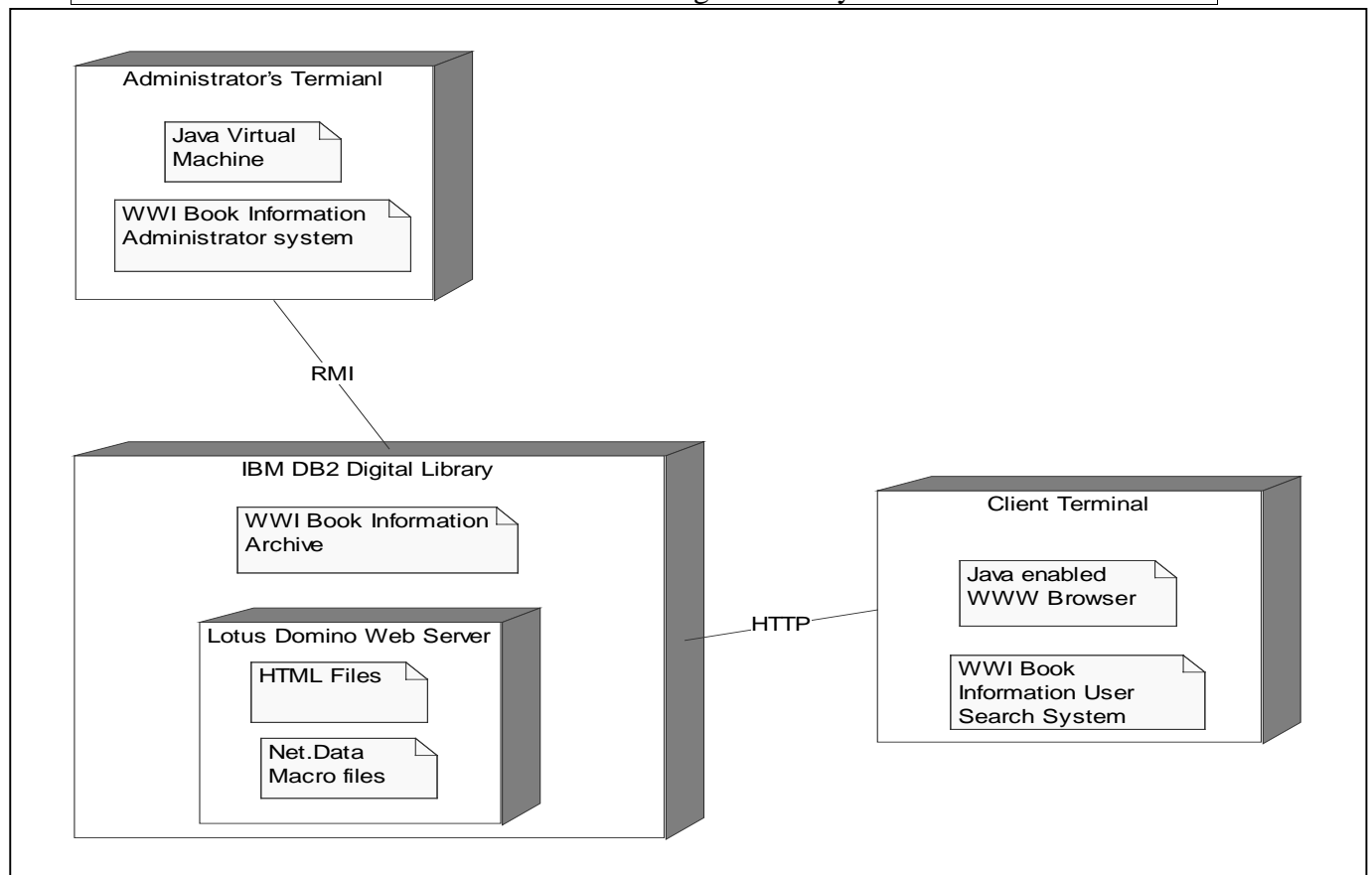
***Figure 22: System Layered View***

**Note:** The components from the analysis component model that have not been broken down into software/hardware design components have been represented by ROSE ‘packages’ and those which have been broken down are represented by ROSE ‘objects’.

### 3.1.3 System Deployment View

The deployment view is used for assigning the components to the deployed hardware and software. This view also shows how the logical components are mapped on the hardware components of the system. In the proposed system we basically will have three hardware components:

User’s machine	--	A 80486/Pentium-based PC, running on Windows 95/NT with 2Mbytes RAM and a Java-enabled browser.
Administrator’s machine	--	A Pentium based PC, running on Windows 95/NT with 32Mbytes RAM and a Java-enabled browser. The administrator's application will be installed on this machine
Web Server	--	A Lotus Domino server which is connected to the IBM DB2 Digital Library.



**Figure 23: System Deployment View**

## 3.2 Object Model

The Object model is a refinement of the components from the Component Model (SSAD 2.1).

### 3.2.1 Detailed Component Specification

This section describes how the components from the Component Model (SSAD 2.1) will be implemented as software elements. In addition to these components additional components are added to make the system realizable in software. The implementation of each component will be also be specified.

#### 3.2.1.1 WWI Archive View

This component implements the component WWI Book Information Archive – COMP-03 in software. This component stores the information about the World War I books and the administrator’s information.

Identity	:	CSPEC-01	
Attributes	:	<ul style="list-style-type: none"> <li>☞ Size</li> <li>☞ Number of records</li> <li>☞ Number of fields</li> </ul>	<ul style="list-style-type: none"> <li>☞ Data Type</li> <li>☞ Name</li> </ul>
Assigned Behaviors	:	<ul style="list-style-type: none"> <li>☞ Stores information about the World War I books</li> <li>☞ Stores the administrator’s information</li> <li>☞ Interacts with the administrator’s application and users application to provide information.</li> </ul>	
Relationships	:		
State Groups	:	Creation {New, Modified, Unmodified}	
Possible Roles	:	Store for information of the World War I books and the administrator	
Constraints	:	☞ Can be modified only by the administrator	
Implementation	:	Implemented as folders in the IBM DB2 Digital Library	

#### 3.2.1.2 Web Browser

This mechanism implements the interface of the user application.

Identity	:	CSPEC-02	
Attributes	:	<ul style="list-style-type: none"> <li>☞ Version</li> </ul>	<ul style="list-style-type: none"> <li>☞ Name</li> </ul>
Assigned Behaviors	:	<ul style="list-style-type: none"> <li>☞ It serves as an graphics interface for the user part of the application</li> <li>☞ Provides information about the books to the user from the database</li> <li>☞ Send e-mails</li> <li>☞ Print documents</li> <li>☞ Copy, cut and paste text as well as images</li> <li>☞ Save and load documents</li> </ul>	
Relationships	:	☞ WWI Book Information User Search System	
State Groups	:	Connectivity {connected to the World Wide Web, not connected} Launch {invoked, not invoked}	
Possible Roles	:	Interface between the user and the WWI Book Information	

	Archive
Constraints	:
Implementation	: Standard COTS like Netscape Navigator or Internet Explorer

### 3.2.1.3 HTML Pages

Identity	: CSPEC-03
Attributes	: ↻ Name of page                      ↻ Links ↻ Text in page
Assigned Behaviors	: ↻ Provide Help Information ↻ Main page information ↻ Display Search results and errors
Relationships	: ↻ WWI Book Information Archive
State Groups	:
Possible Roles	:
Constraints	: Needs a web browser like Netscape Navigator or Internet Explorer
Implementation	: HTML 4.0

### 3.2.1.4 Net.Data Macro File

Identity	: CSPEC-04
Attributes	: ↻ Name of file                      ↻ Net.Data macros
Assigned Behaviors	: ↻ Provide Help Information ↻ Main page information
Relationships	: ↻ WWI Book Information Archive ↻ WWI Book Information User Search System
State Groups	: {Idle, In execution}
Possible Roles	:
Constraints	: Needs a web browser like Netscape Navigator or Internet Explorer
Implementation	: Macro file

### 3.2.1.5 Portable Document Files

Identity	: CSPEC-05
Attributes	: ↻ Name of file                      ↻ Size
Assigned Behaviors	: ↻ Contain all the information about the WWI books like the table of contents, imprint, images, etc.
Relationships	: ↻ WWI Book Information Archive ↻ WWI Book Information User Search System
State Groups	: {Displayed, created, not created}
Possible Roles	: Conveyor of information
Constraints	: Needs Adobe Acrobat for viewing.
Implementation	: PDF file

### 3.2.2 Object Specifications

This section identifies the various objects that are present in the system. We consider the objects for the WWI Book Information User Search System, WWI Book Information Administrator System and the Server system.

*WWI Book Information User Search System:*

The objects in this system are:

1. AnMainCollectionEntryPage
2. AnAdvancedSearchEntryPage
3. AnDynamicSearchResultPage
4. AnNormalSearchHelpPage
5. AnAdvancedSearchHelpPage
6. AnResultHelpPage
7. AnKeywordErrorPage
8. AnResultErrorPage
9. AnNetMacroQueryFile
10. AnNetMacroResultDisplayFile
11. AnResultPDFFile
12. AnE-mail

#### 3.2.2.1 AnMainCollectionEntryPage

Identity	:	OBJC-01
Defining Quality	:	The initial web page that allows the users to access the designed search subsystem and enter the keywords.
Name	:	AnMainCollectionEntryPage
Object Interactions	:	
States	:	
Roles	:	Entry Collector
Constraints	:	Depends on the browser for the format and the communication network for the transfer of the page.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML page

#### 3.2.2.2 AnAdvancedQueryEntryPage

Identity	:	OBJC-02
Defining Quality	:	The web page that allows the users to access the designed search subsystem and perform an advanced query with the help of Boolean operators.
Name	:	AnAdvancedQueryEntryPage
Object Interactions	:	
States	:	
Roles	:	Entry Collector
Constraints	:	Depends on the browser for the format and the

		communication network for the transfer of the page.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML page

### 3.2.2.3 *AnDynamicSearchResultPage*

Identity	:	OBJC-03
Defining Quality	:	Output page containing formatted search results. Allows navigation between different search result pages.
Name	:	AnDynamicSearchResultPage
Object Interactions	:	
States	:	
Roles	:	Retrieved Information Displayer
Constraints	:	Depends on the browser and the Net.Data file for the format and the communication network for the transfer of the page.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Dynamic HTML Page generated by NET.DATA macro.

### 3.2.2.4 *AnNormalSearchHelpPage*

Identity	:	OBJC-04
Defining Quality	:	The web page that provides the user with help on the normal search page.
Name	:	AnNormalSearchHelpPage
Object Interactions	:	
States	:	
Roles	:	Help Provider
Constraints	:	Depends on the browser for the format.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML Page

### 3.2.2.5 *AnAdvancedSearchHelpPage*

Identity	:	OBJC-05
Defining Quality	:	The web page that provides the user with help on the advanced search page.
Name	:	AnAdvancedSearchHelpPage
Object Interactions	:	
States	:	
Roles	:	Help Provider
Constraints	:	Depends on the browser for the format.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML Page

*3.2.2.6 AnResultHelpPage*

Identity	:	OBJC-06
Defining Quality	:	The web page that provides the user with help on the results page.
Name	:	AnResultHelpPage
Object Interactions	:	
States	:	
Roles	:	Help Provider
Constraints	:	Depends on the browser for the format.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML Page

*3.2.2.7 AnKeywordErrorPage*

Identity	:	OBJC-07
Defining Quality	:	The web page that provides help on the keywords for better results from the system.
Name	:	AnKeywordErrorPage
Object Interactions	:	
States	:	
Roles	:	Help Provider
Constraints	:	Depends on the browser for the format.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML Page

*3.2.2.8 AnResultErrorPage*

Identity	:	OBJC-08
Defining Quality	:	The web page that helps the different errors that they may encounter while using the application.
Name	:	AnResultErrorPage
Object Interactions	:	
States	:	
Roles	:	Help Provider
Constraints	:	Depends on the browser for the format.
Component Membership	:	HTML Pages (SSAD 3.2.1.3)
Implementation	:	Static HTML Page

*3.2.2.9 AnNetMacroQueryFile*

Identity	:	OBJC-09
Defining Quality	:	This is a macro file that takes the keywords from the HTML page and creates a query. It makes a connection with the server on which IBM DL is located.
Name	:	AnNetMacroQueryFile
Object Interactions	:	
States	:	
Roles	:	Parser
Constraints	:	Can reside only on the Lotus Domino Server.

Component Membership	:	Net.Data macro files (SSAD 3.2.1.4)
Implementation	:	Net.Data Macro

#### 3.2.2.10 AnNetMacroResultDisplayFile

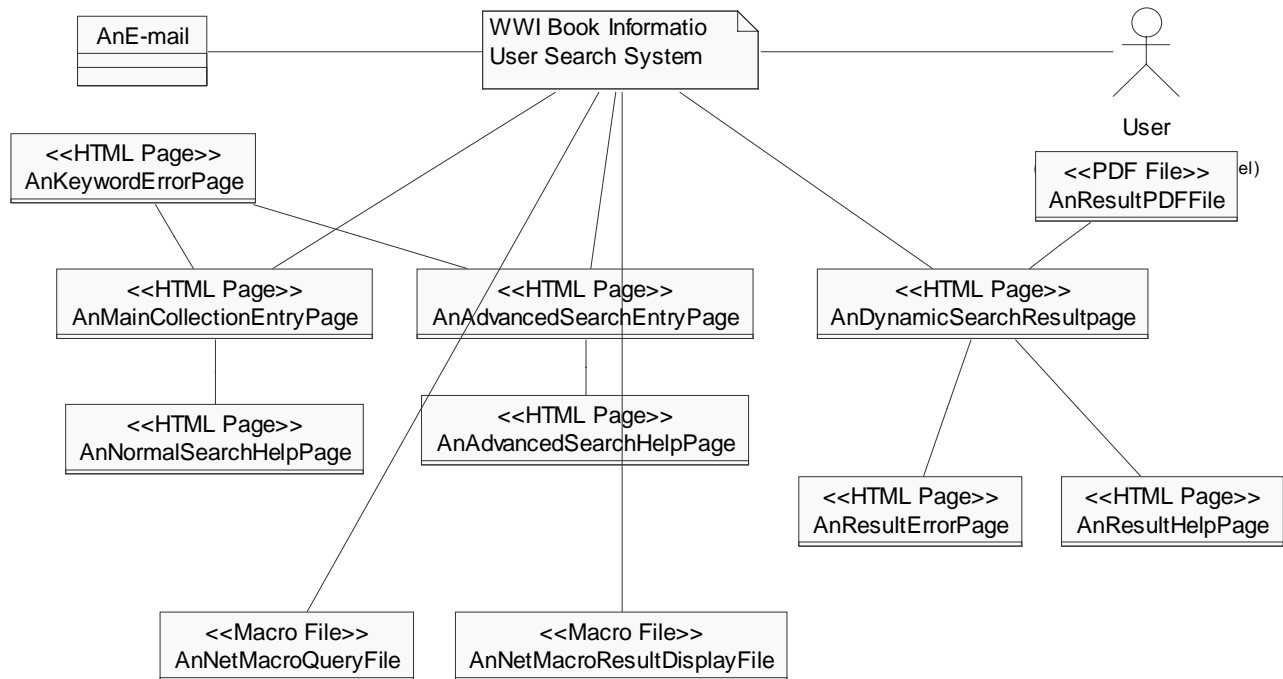
Identity	:	OBJC-10
Defining Quality	:	This macro file receives the results from the IBM DL and generates dynamic HTML pages to display the result.
Name	:	AnNetMacroResultDisplayFile
Object Interactions	:	
States	:	
Roles	:	Result Display Creator
Constraints	:	Can reside only on the Lotus Domino Server.
Component Membership	:	Net.Data macro files (SSAD 3.2.1.4)
Implementation	:	Net.Data Macro

#### 3.2.2.11 AnResultPDFFile

Identity	:	OBJC-11
Defining Quality	:	This PDF file contains all the information about the WWI book like the table of contents, imprint, images, etc.
Name	:	AnResultPDFFile
Object Interactions	:	
States	:	
Roles	:	Result Displayer
Constraints	:	The user must use Adobe Acrobat to view the file
Component Membership	:	Portable Document Files(SSAD 3.2.1.5)
Implementation	:	Portable Document File created in Adobe Acrobat

#### 3.2.2.12 AnE-mail

Identity	:	OBJC-12
Defining Quality	:	Used to send the e-mail to the librarian.
Name	:	AnE-mail
Object Interactions	:	
States	:	
Roles	:	Mode of communication between the user and the librarian.
Constraints	:	The browser first has to be configured (mail server name, login name, etc)
Component Membership	:	WWI Book Information User Search System (SSAD 2.1.1)
Implementation	:	COTS



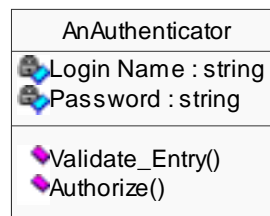
***Figure 24: Object Interaction for the WWI Book Information User Search System***

*WWI Book Information Administrator System:*  
The objects in this system are:

1. AnAuthenticator
2. AnErrorMessageHandler
3. AnBookListFilter
4. AnFilterCriteriaEntryInterface
5. AnBookInterfaceManager
6. AnBookInformationEntryForm
7. AnBookinfoController
8. AnAdministratorAuthorizationHelp
9. AnAdministratorBookInformationHelp
10. AnAdministratorFilterHelp

### 3.2.2.13 AnAuthenticator

Identity	:	OBJC-13
Defining Quality	:	Managing the input of administrator information for authentication. The object is also responsible for validating the input.
Name	:	AnAuthenticator
Object Interactions	:	
States	:	Authentication state { Authenticated, Unauthenticated }
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object



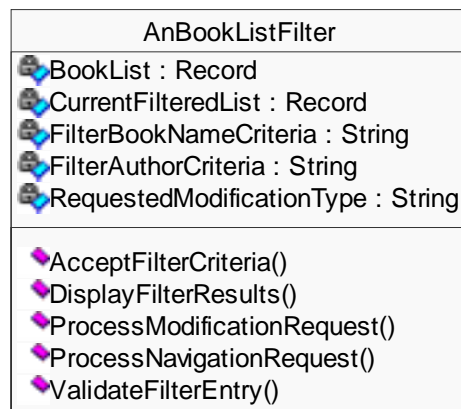
### 3.2.2.14 AnErrorMessageHandler

Identity	:	OBJC-14
Defining Quality	:	Message box displaying 'Are You Sure' text for deletion and modification requirements..
Name	:	AnErrorMessageHandler
Object Interactions	:	
States	:	Visibility { Visible, Hidden } Option { option enabled, option disabled }
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object



### 3.2.2.15 AnBookListFilter

Identity	:	OBJC-15
Defining Quality	:	The BookListFilter manages filtering of the existent records in the database as required by the administrator. It enables to easily select the Book Item that he wants to update or delete.
Name	:	AnBookListFilter
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object

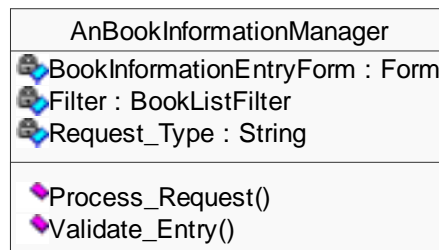


### 3.2.2.16 AnFilterCriteriaEntryInterface

Identity	:	OBJC-16
Defining Quality	:	The Filter Criteria Entry Interface is used to accept filter criteria from the administrator
Name	:	AnFilterCriteriaEntryInterface
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object

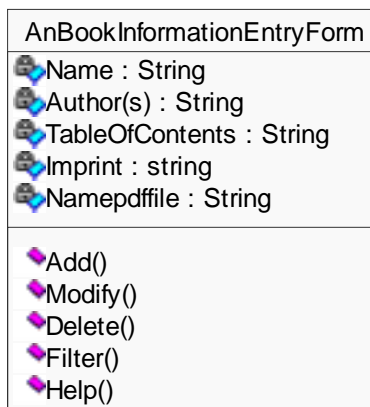
### 3.2.2.17 AnBookInfomationManager

Identity	:	OBJC-17
Defining Quality	:	Manages Book Information entries for updating
Name	:	AnBookInformationManager
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object



### 3.2.2.18 AnBookInformationEntryForm

Identity	:	OBJC-18
Defining Quality	:	Interface on which the Book Information can be added by the administrator
Name	:	AnBookInformationEntryForm
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Java Object




### 3.2.2.19 AnBookInfoController

Identity	:	OBJC-19
Defining Quality	:	COTS Digital Library Java API Class
Name	:	AnBookInfoController
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	DL Java API Class

### 3.2.2.20 AnAdministratorAuthorizationHelp

Identity	:	OBJC-20
Defining Quality	:	The administrative application requires help features to help a novice administrator learn the ropes. The Authorization help page details the steps to be followed to authenticate and connect to the DL.
Name	:	AnAdministratorAuthorizationHelp
Object Interactions	:	
States	:	
Roles	:	Help provider
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	.HLP file

AnAdministratorAuthorizationHelp
 AuthorizationHelp : String

### 3.2.2.21 AnAdministratorBookInformationHelp

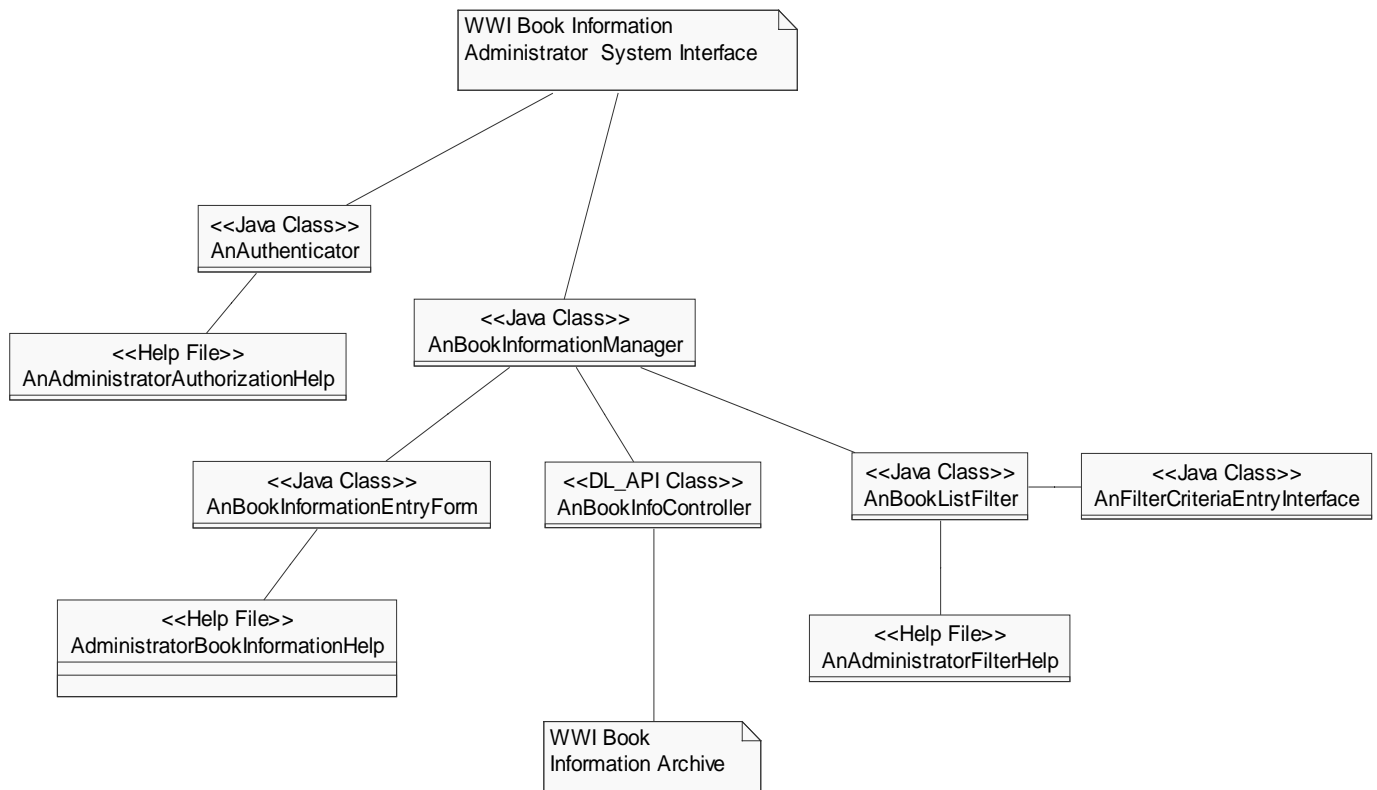
Identity	:	OBJC-21
Defining Quality	:	The Book Information Entry interface contains information regarding how to use the form and the constraints involved.
Name	:	AnAdministratorBookInformationHelp
Object Interactions	:	
States	:	
Roles	:	Help provider
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	.HLP file

AnAdministratorBookInformationHelp
📖BookInfoHelp : String

### 3.2.2.22 AnAdministratorFilterHelp

Identity	:	OBJC-22
Defining Quality	:	The Filter help interface provides information about using Filter
Name	:	AnAdministratorFilterHelp
Object Interactions	:	
States	:	
Roles	:	Help provider
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	.HLP file

AnAdministratorFilterHelp
📖Content : String



**Figure 24: Object Interaction for the WWI Book Information Administrator System**

*Server System:*

The objects in this system are:

1. AnWebServer
2. AnBookItemController
3. AnWWIBookInformation
4. AnAdministratorInformation

*3.2.2.23 AnWebServer*

Identity	:	OBJC-23
Defining Quality	:	COTS
Name	:	AnWebServer
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	COTS

*3.2.2.24 AnBookItemController*

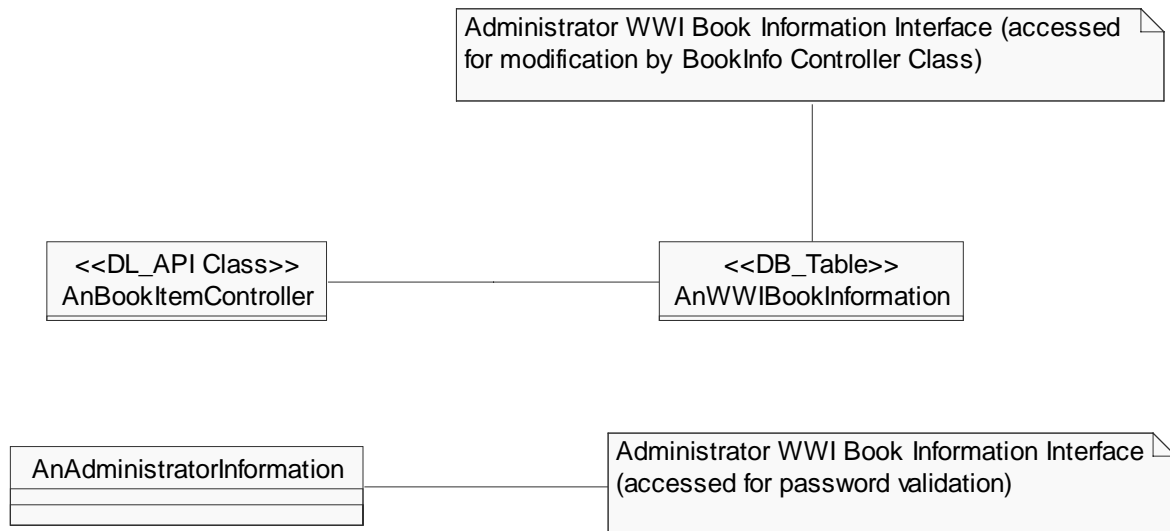
Identity	:	OBJC-24
Defining Quality	:	COTS
Name	:	AnBookItemController
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Digital Library API

*3.2.2.25 AnWWIBookInformation*

Identity	:	OBJC-25
Defining Quality	:	Contains the WWI Book related information querying.
Name	:	AnWWIBookInformation
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Folder in IBM Digital Library

### 3.2.2.26 AnAdministratorInfomation

Identity	:	OBJC-26
Defining Quality	:	Contains the Administrator related information for authentication.
Name	:	AnAdministratorInformation
Object Interactions	:	
States	:	
Roles	:	
Constraints	:	
Component Membership	:	WWI Book Information Administrator System (SSAD 2.1.2)
Implementation	:	Folder in IBM Digital Library



***Figure 25: Object Interaction for the Server Sub-System***

## 3.3 Operations Model

The Operations Model is obtained by refining the behavior model. In this section the Behavior Model is augmented with the critical operations which have to be carried out. The Operations Model explains the detailed behaviors, which includes the detailed policies and the algorithms used to meet that policy and the various operations that occur in the system and the operation specifications which are further explained by the UML sequence diagrams.

### 3.3.1 Detailed Behaviors

#### 3.3.1.1 Critical Algorithms

- 1) Entering book details and validation of entry (For BEHV-XX)
- 2) Authentication of the user of the administrator application (For BEHV-XX)
- 3) User query converted into a database query (For BEHV-XX)
- 4) Displaying of results (For BEHV-XX)
- 5) Help provided in administrator's and users application (For BEHV-XX)

The operations are initiated by the following behaviors:

- 1) Administrator adds, modifies or deletes a book entry
- 2) The user generates queries using normal search
- 3) The user generates queries using advanced search
- 4) The user communicates with the reference librarian
- 5) The user or the administrator/reference librarian selects the help feature

#### 3.3.1.2 Detailed Policies and Algorithms

##### **Validation of user:**

**Policy** : Validation of the user using the administrator's application

**Algorithm:** The user will first have to input the login name. He will then have to enter the password. This password will then be encrypted. The login name and the encrypted password will be checked with the login names and their corresponding password. If they match then the person will be allowed access to the application. Depending on whether the login name and the password match that of the administrator or the reference librarian, complete or partial access will be given. The person will be given three chances to log into the application after which the application will shut down.

##### **Updating Information Base:**

**Policy :** The administrator should be able to add, modify and delete information from the IBM Digital Library.

**Algorithm:** The administrator will first select the operation that he wishes to perform. If it is an add operation he will first enter the call number. A check will be made to see whether the call number exists or not in order to ensure that there are no two records with the same call number. Then he will enter the book title, name of the author(s), table of contents and other details (if present) like the imprint and the description of maps. In case the modify or the delete option is selected, the records will be first filtered according to the criteria (e.g. title of the book, name of the authors(s), call number). If no filter criterion is entered, then all the records will be displayed and the administrator will select the record to be modified. If the filter criterion is entered, then only the records satisfying that criteria will be displayed. In case of the modify option all the data corresponding

to the book will be displayed and the administrator will be able to change all the details except the call number. In case of the delete option the administrator will be able to delete the record from the Information Base.

### 3.3.1.3 Operations

The following operations have been derived from the behavior model.

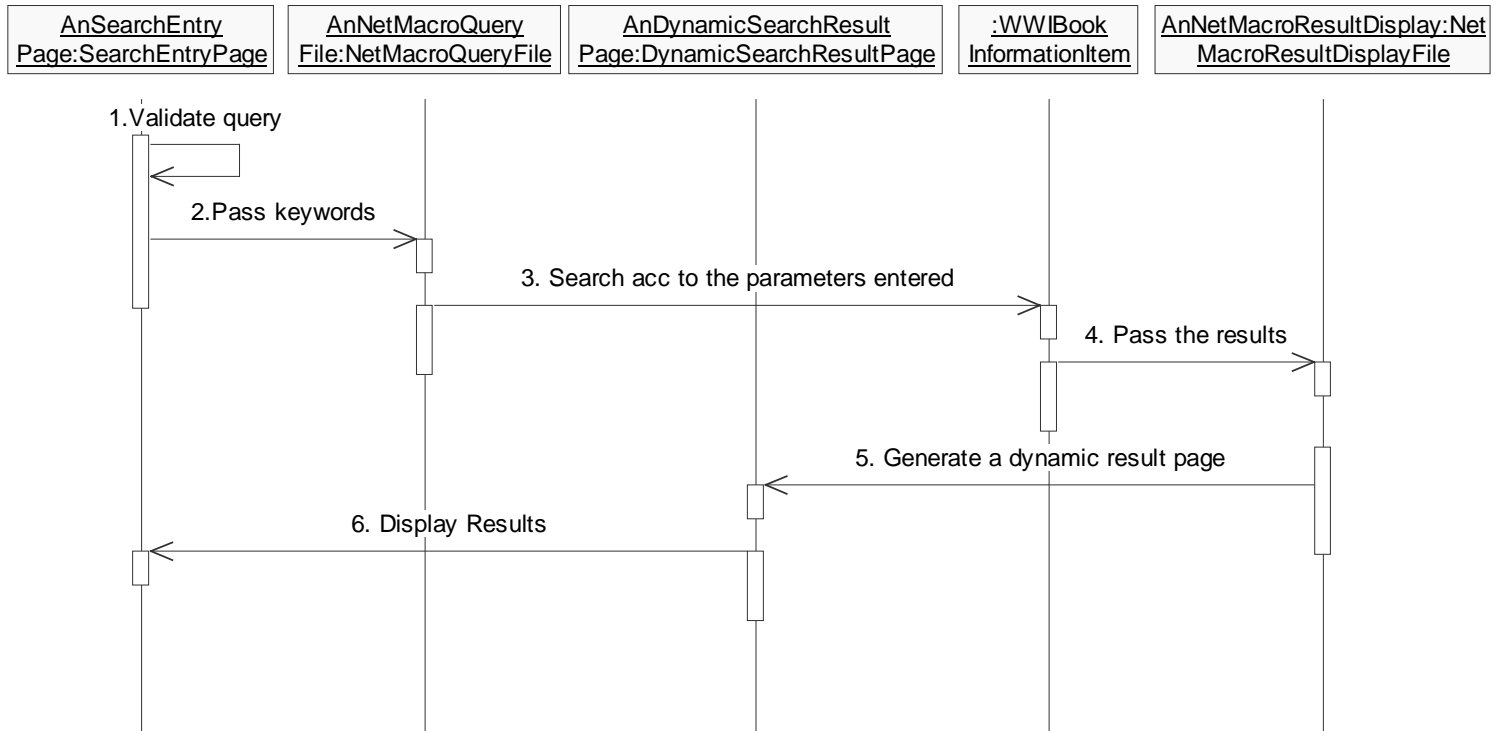
- ☞ User searches the WWI Book Information Archive (BEHV –06 & BEHV-07)
- ☞ Validate User Query (BEHV –07)
- ☞ Navigate through the results (BEHV –11)
- ☞ User selects help option (BEHV –13)
- ☞ Communicate with the administrator (BEHV--12)
- ☞ Validate Book Entry (BEHV --01, BEHV--02, & BEHV--03)
- ☞ Filter the records (BEHV –02 & BEHV-03)
- ☞ Addition of information of the WWI books (BEHV –01)
- ☞ Modification/deletion of information of the WWI books (BEHV –02 & BEHV-03)
- ☞ Authentication of the user of the WWI Book Information Administrator System (BEHV –05)
- ☞ Retrieve appropriate Book detail (BEHV –10)
- ☞ Administrator selects help option (BEHV –04)

### 3.3.2 Operations Specifications

#### 3.3.2.01 User searches the WWI Book Information Archive

Identity	:	OPER-01
Event	:	The user uses the WWI Book Information Search System for getting detailed information about the World War I books
Initiator – Policy	:	The WWI Book Information Archive is searched according to the query generated from the keyword(s) entered by the user.
Passed Parameters	:	Database query
Return Values	:	Results matching the query
Exception Handling	:	In case no matches are found in the database, an appropriate error message will be displayed
Guards	:	
Validation	:	
Messages	:	
Exits	:	A dynamically created HTML page displaying results of the search
Synchronization	:	At the same time when other users are accessing the application and querying the WWI Book Information Archive
Constraints	:	The performance may deteriorate if the number of users exceed the number of concurrent users supported.

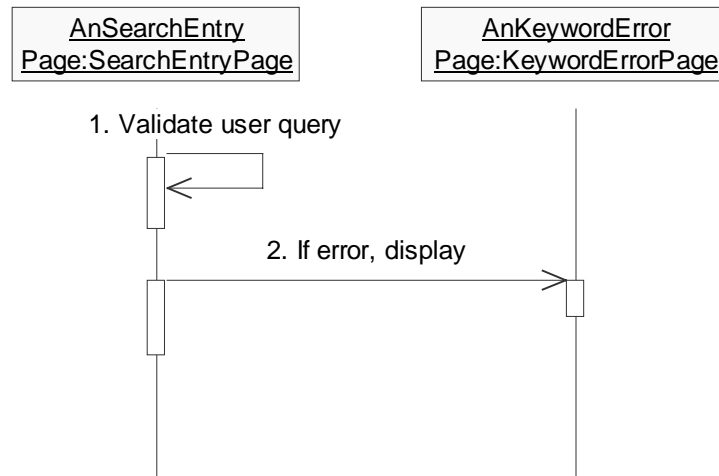
Refer : Figure - 26



***Figure 26: User searches the WWI Book Information Archive***

### 3.3.2.02 Validate User Query

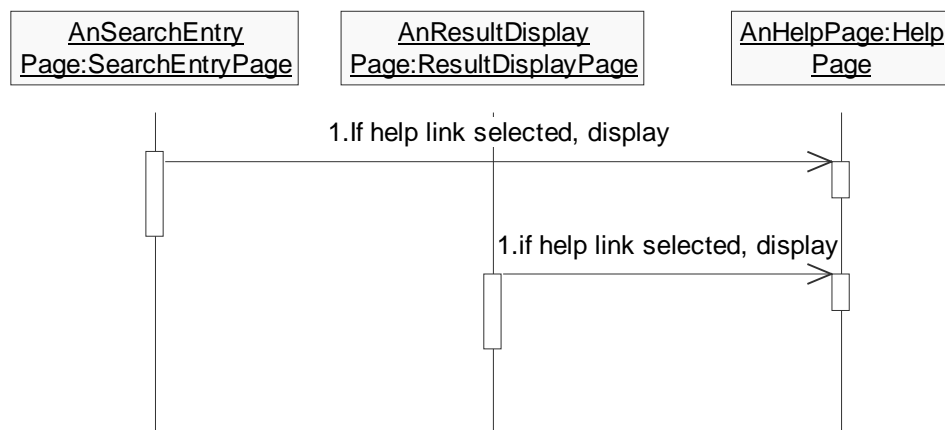
Identity	:	OPER-02
Event	:	The user has entered the keyword(s)
Initiator – Policy	:	The keyword(s) entered by the user should meet some requirements e.g. no special characters, some keyword(s) should be entered
Passed Parameters	:	The keyword(s) entered by the user
Return Values	:	
Exception Handling	:	In case of any errors, appropriate HTML pages will be displayed
Guards	:	
Validation	:	
Messages	:	In case of any errors an appropriate HTML error pages will be displayed.
Notification	:	
Exits	:	
Synchronization	:	
Constraints	:	
Refer	:	Figure - 27



***Figure 27: Validate User Query***

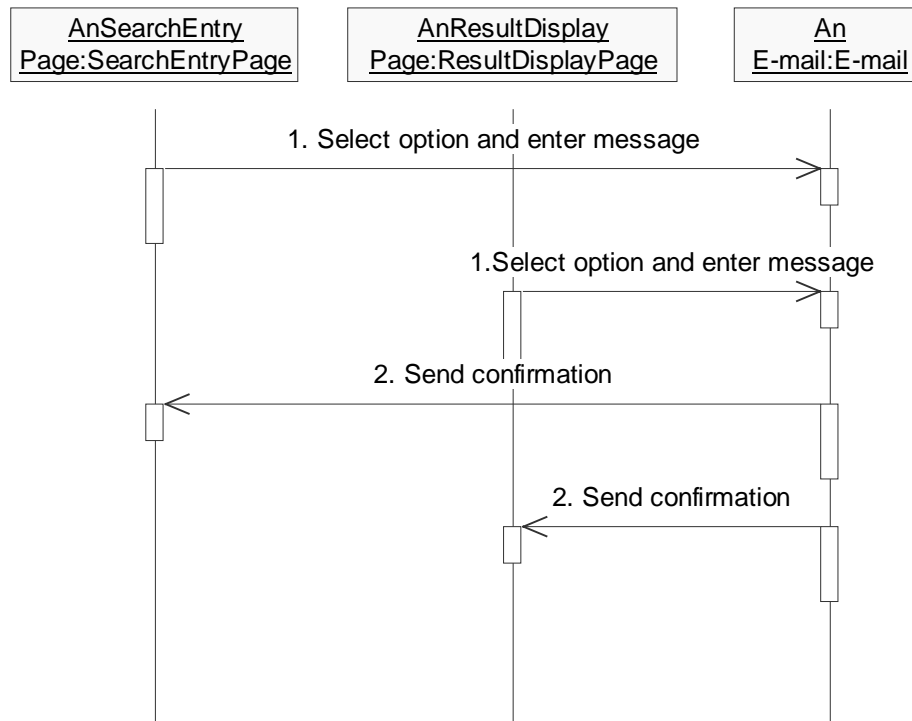
### 3.3.2.03 User selects help option

Identity	:	OPER-03
Event	:	User selects the help link
Initiator –	:	When the user selects this link, a detailed help HTML page should be displayed which would explain all the features which the application offers along with some helpful hints
Policy	:	should be displayed which would explain all the features which the application offers along with some helpful hints
Passed Parameters	:	URL address of the help HTML page
Return Values	:	HTML page which displays the help information
Exception Handling	:	In case of network problems, timeout can be used and if the URL address is corrupted, then an error message will be displayed
Guards	:	
Validation	:	
Messages	:	
Exits	:	HTML page
Synchronization	:	Should happen at the same time when a number of users are Accessing the help option
Constraints	:	
Refer	:	Figure – 28



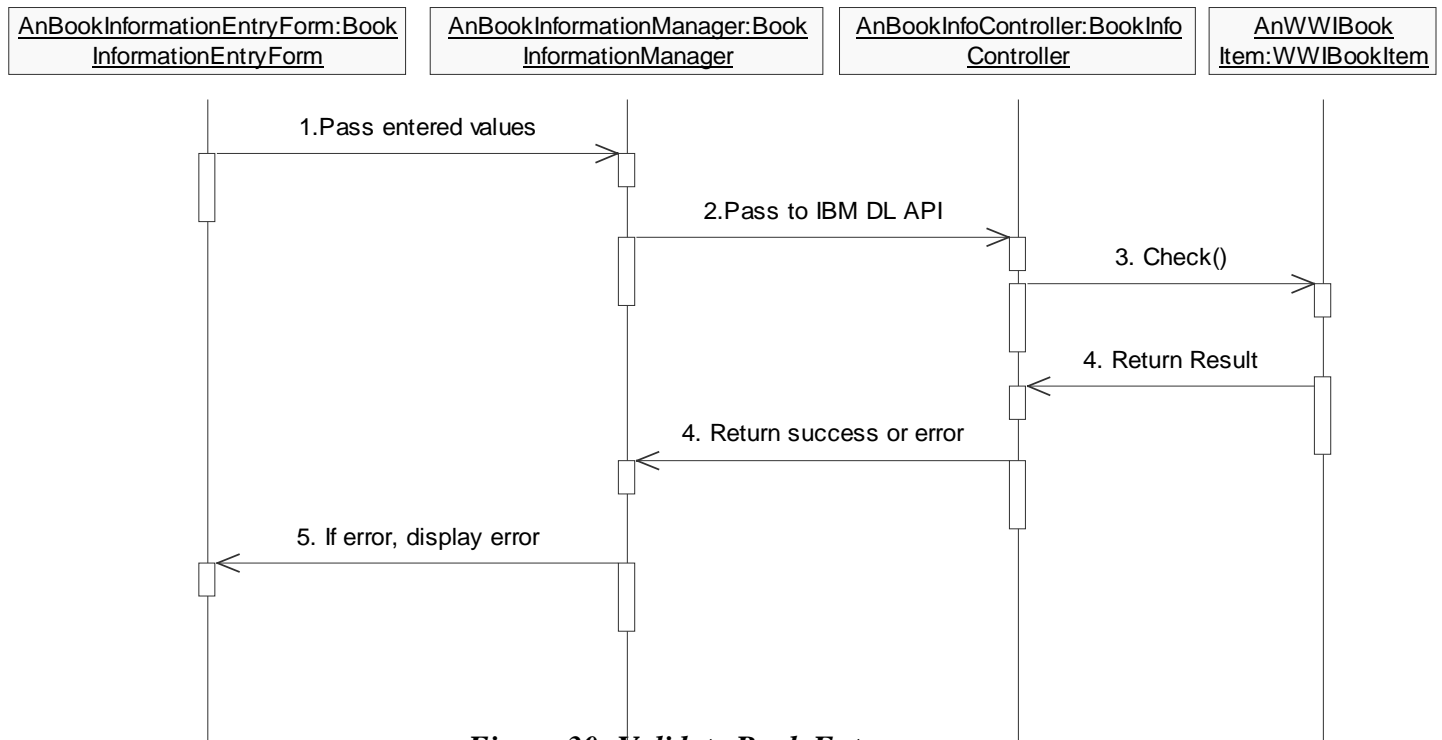
**Figure 28: User selects the Help Option****3.3.2.04 Communicate with the administrator**

Identity	:	OPER-04
Event	:	The user clicks on the e-mail administrator link
Initiator – Behavior	:	BEHVXX: Communicate with the reference librarian
Passed Parameters	:	The message to be sent to the reference librarian
Return Values	:	Confirmation that the e-mail has been sent
Exception Handling	:	In case the link is not working, an error message will be displayed. Also in case of network errors, timeout can be used
Guards	:	The e-mail address of the reference librarian will be entered from before so there is no possibility of the e-mail being sent to a wrong address
Validation	:	
Messages-Notification	:	An message box which would confirm whether the mail has been sent or not
Exits	:	An e-mail
Synchronization	:	
Constraints	:	
Refer	:	Figure – 29

**Figure 29: Communicate with the administrator**

### 3.3.2.05 Validate Book Entry

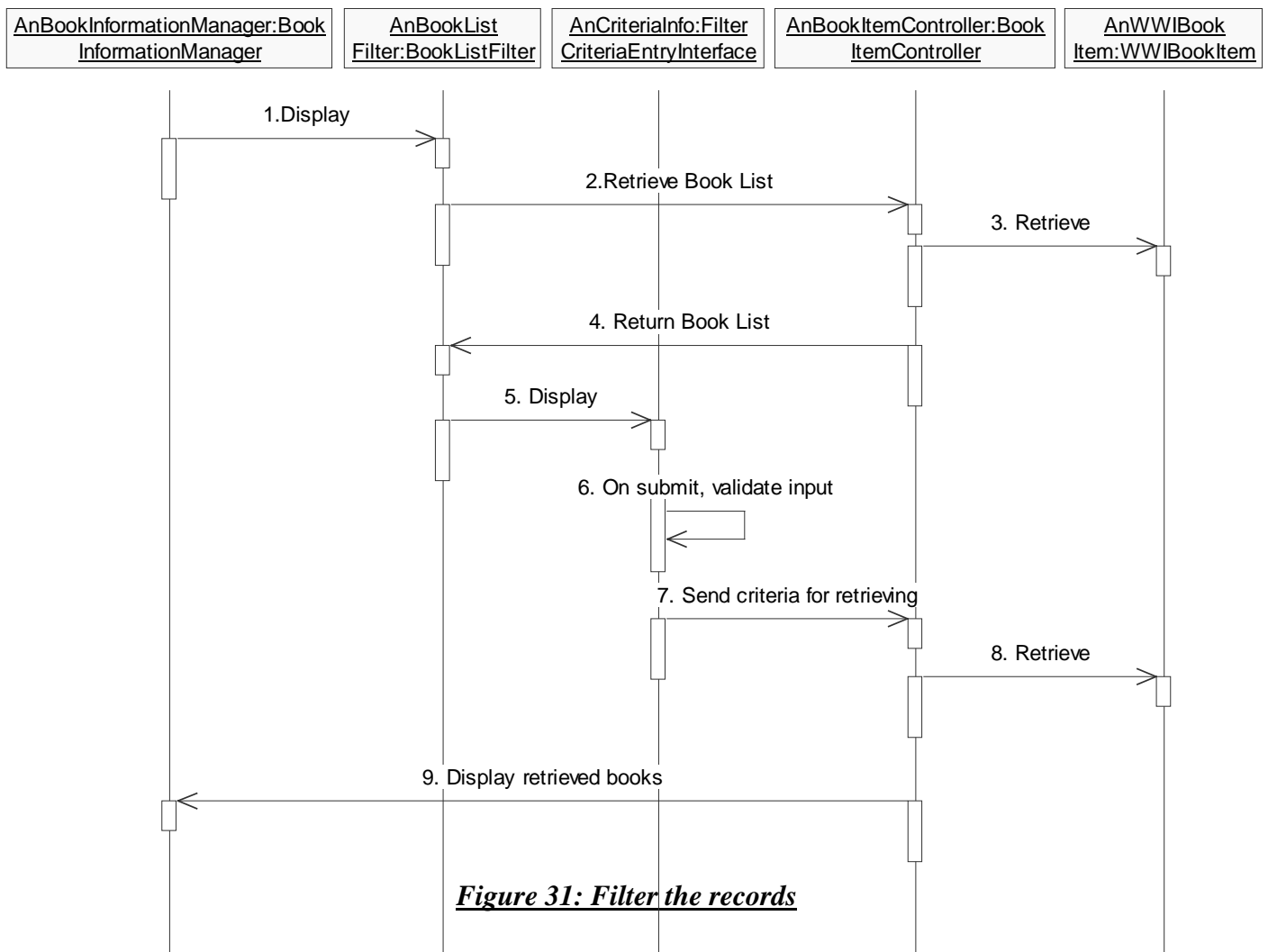
Identity	:	OPER-05
Event	:	The administrator is adding/modifying the details of a book in the WWI Book Information Archive
Initiator – Policy	:	There will be certain requirements like the call number, title, author(s) and the table of contents cannot be left blank and the call number cannot be repeated
Passed Parameters	:	Details of the book like the call number, title, author(s), imprint and the .pdf file, which contains all the information along with the images.
Return Values	:	
Exception Handling	:	
Guards	:	
Validation	:	In case of errors, appropriate error messages will be displayed.
Messages – Notification	:	Depending on the error, an appropriate error message will be Displayed in a warning message box
Exits	:	
Synchronization	:	Should occur at the same time when the addition or modification or deletion operation is occurring and/or when the users are accessing the database in the form of queries
Constraints	:	
Refer	:	Figure – 30



***Figure 30: Validate Book Entry***

## 3.3.2.06 Filter the records

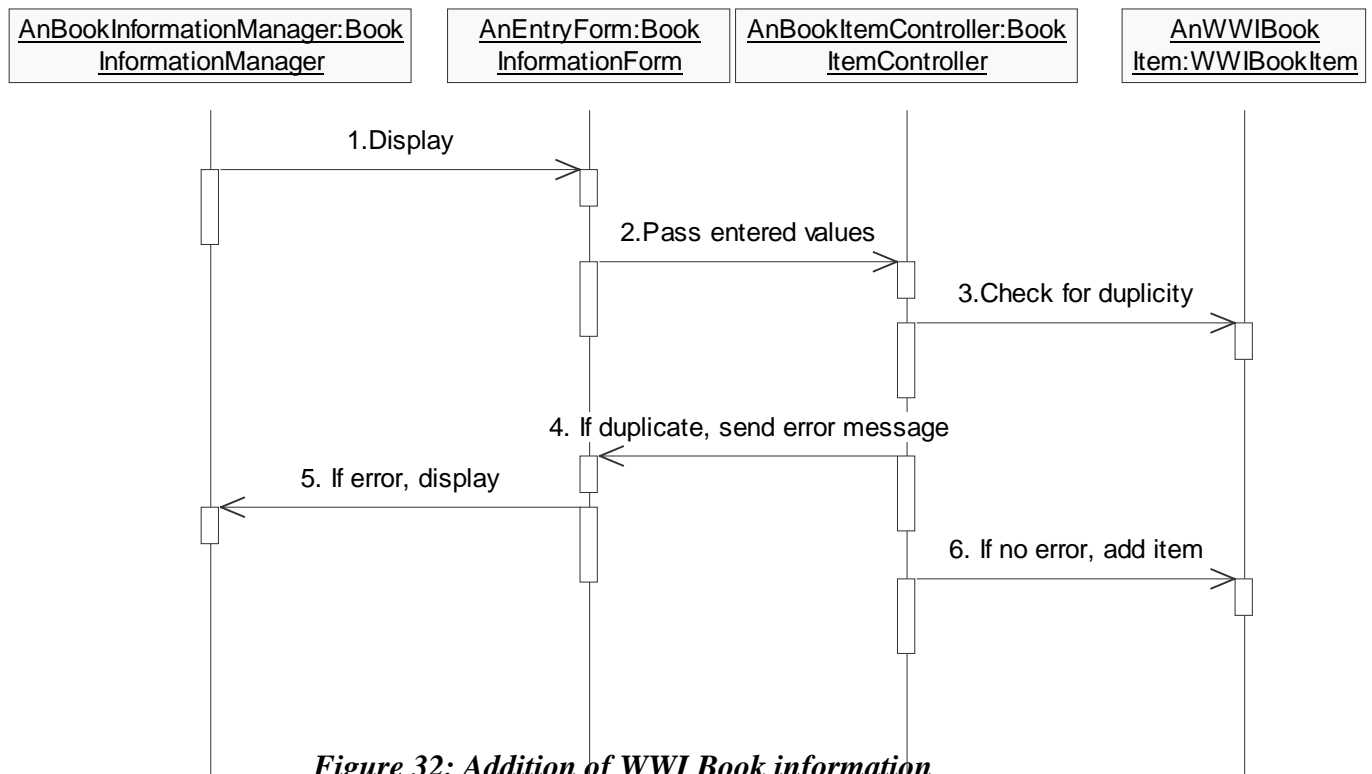
Identity	: OPER-06
Event	: Administrator uses the filter to select the books satisfying some pre-defined criteria
Initiator – Policy	: The filter criteria (on title, author(s), etc) has to be specified
Passed Parameters	: Filter criteria parameter along with the value of the parameter on which filtering will take place
Return Values	: Records satisfying the filter criteria
Exception Handling	: Invalid criteria entry
Guards	:
Validation	:
Messages-Notification	: In case of no records satisfying the filter criteria, error message will be displayed
Exits	: List of records
Synchronization	:
Constraints	: The filter criteria can be selected only for certain attributes
Refer	: Figure – 31



***Figure 31: Filter the records***

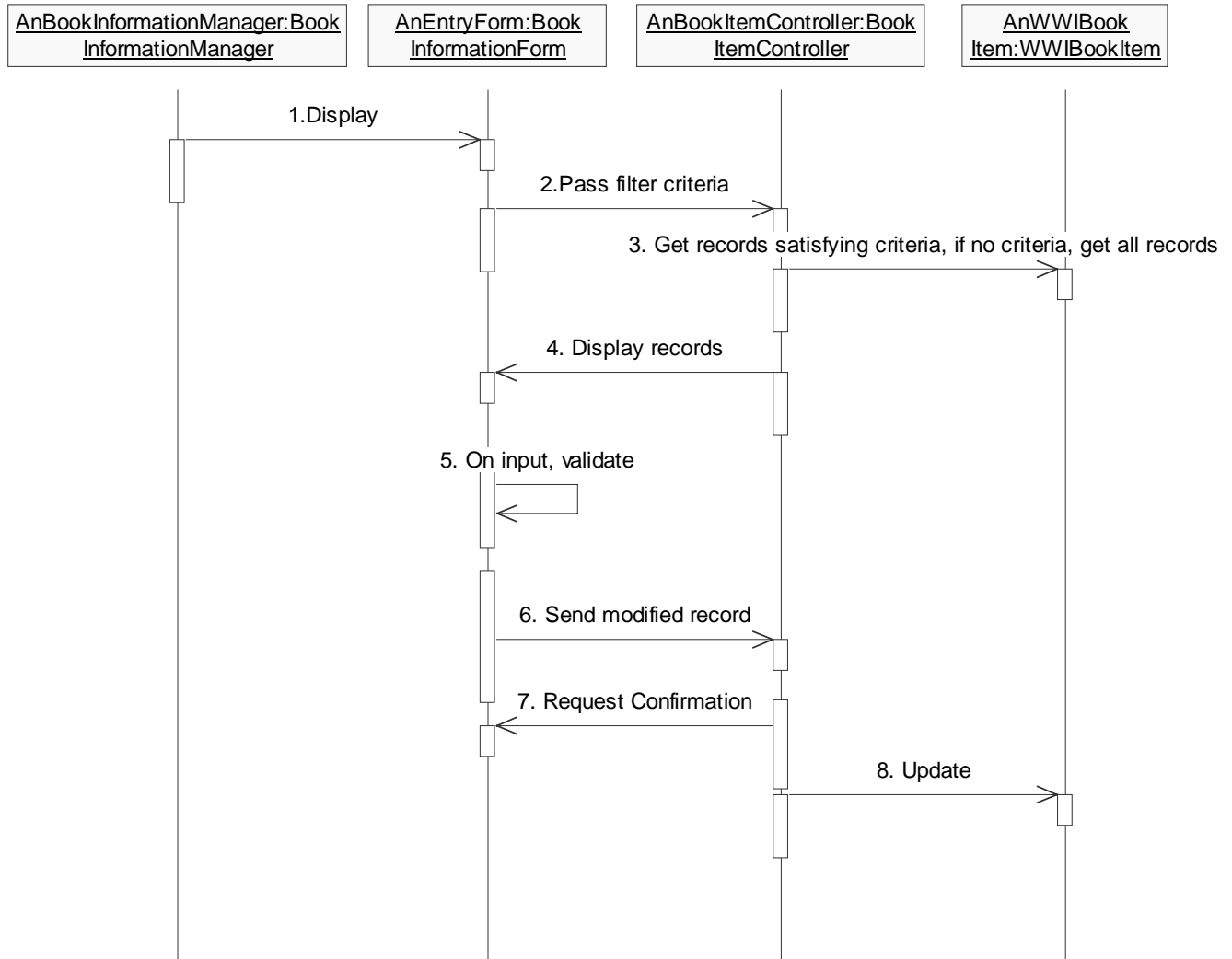
### 3.3.2.07 Addition of information of the WWI books

Identity	:	OPER-07
Event	:	The administrator wants to add the details of a book in the WWI Book Information Archive
Initiator –Behavior	:	BEHV-XX: Add new information
Passed Parameters	:	<ul style="list-style-type: none"> <li>☞ OCR text of the table of contents, imprint</li> <li>☞ Title, name of author(s)</li> <li>☞ PDF file containing all information like title, name of author(s), call number, imprint, images, etc.</li> </ul>
Return Values	:	
Exception Handling	:	In case the details of the book already exist, then an appropriate error message will be displayed
Guards	:	This operation can be performed only from a single machine at a time
Validation	:	The call number of the new book has to be unique
Messages	:	
Exits	:	A record added to the appropriate folder in the IBM DL
Synchronization	:	Should be possible at the same time when the users are accessing the database in the form of queries
Constraints	:	There will be no text except for the call number for books written in languages apart from English. Only a .pdf file will be added for such books.
Refer	:	Figure - 32



### 3.3.2.08 Modification/Deletion of information of the WWI books

Identity	:	OPER-08
Event	:	The administrator wants to modify the details of a book or delete the information about a particular book in the WWI Book Information Archive
Initiator – Behavior	:	BEHVXX :Modify existing information and BEHVXX:Delete Existing information
Passed Parameters	:	
Return Values	:	Confirmation that the modifications have been/not been made or the information has been/not been deleted.
Exception Handling	:	In case the details of the book do not exist at all in the WWI Book Information Archive, then an appropriate error message will be displayed
Guards	:	This operation can be performed only from a single machine at a time
Validation	:	For this operation to occur, the information has to exist in the Database
Messages – Notification	:	Message Box asking for confirmation for modification/deletion of the record
Exits	:	One or more record modified/deleted from the table in the database
Synchronization	:	Should be possible at the same time when the users are accessing the database in the form of queries
Constraints	:	In case of modifying the information, the call number of the book cannot be modified. Also the .pdf file will have to be updated to reflect the changes.
Refer	:	Figure – 33

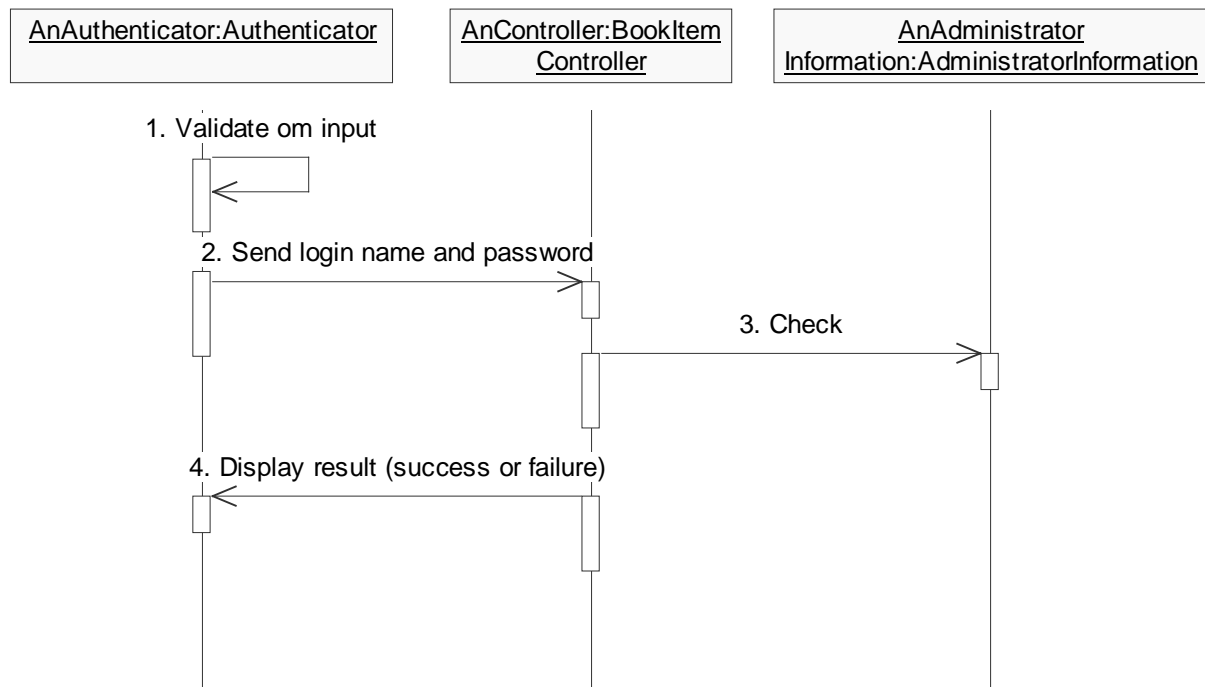


***Figure 32: Modification/Deletion of WWI Book Information***

### 3.3.2.09 Authentication of the user of the WWI Book Information Administrator System

Identity	: OPER-09
Event	: User opens the administrator's application
Initiator – Policy	: Only the user with the correct login name and password of the administrator can access this application
Passed Parameters	:  Login name Password
Return Values	: Access or denial to the application
Exception Handling	: In case of denial to access the application, a message box with the appropriate error message will be displayed
Guards	: This operation can be performed only from a single machine at a time

Validation	:	The login name and the password entered will be compared with those stored in the database
Messages – Notification	:	A message box notifying the user of the unsuccessful attempt to log into the administrator's application in case of entry of wrong login name and/or password.
Exits	:	Success or failure result
Synchronization	:	
Constraints	:	
Refer	:	Figure – 33

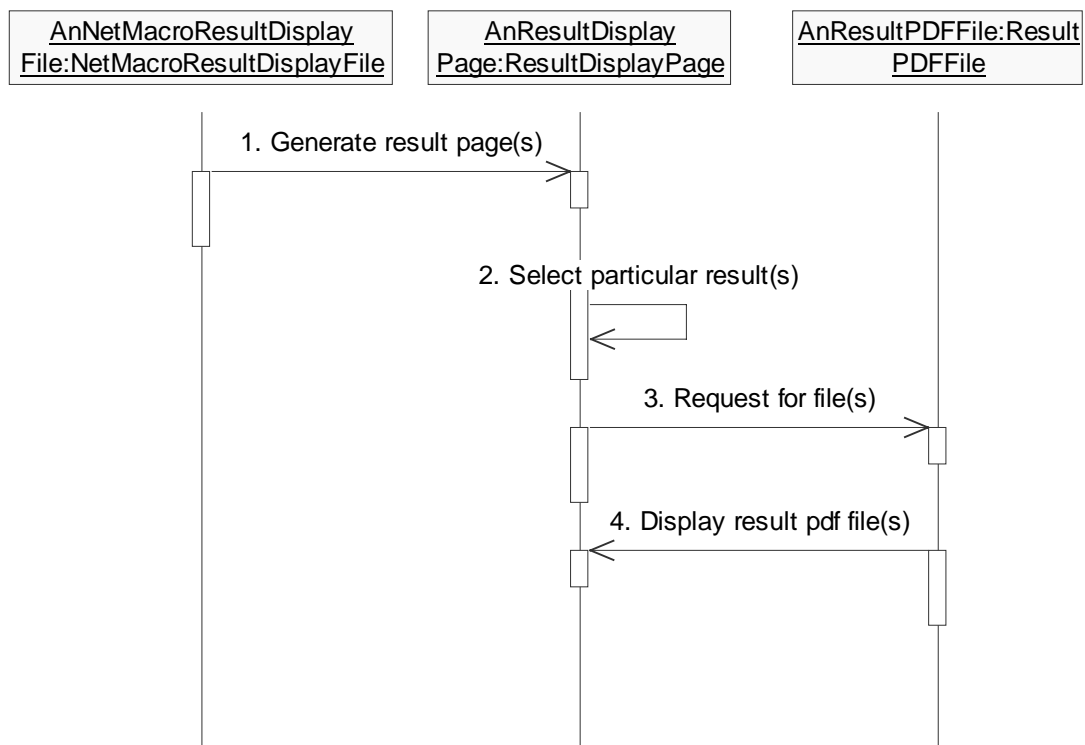


***Figure 33: Authenticate User of the WWI Book Information Administrator System***

### 3.3.2.10 Retrieve appropriate book detail

Identity	:	OPER-10
Event	:	The user enters the keyword(s)
Initiator – Policy	:	The keyword(s) are passed as parameters to the Net.Data macro file. This file connects to the IBM DL and searches the database. The other Net.Data macro file generates the result HTML page with the hyperlinks to the .pdf file of each of the matched book.
Passed Parameters	:	Keyword(s)
Return Values	:	An HTML page(s) with hyperlinks to the .pdf file of the books matching the keyword(s). The .pdf file contains all the information about the book like the table of contents, name of author(s), imprint, call number and the images.

Exception Handling	:	Appropriate HTML error pages will be displayed
Guards	:	The hyperlink to each result will be linked uniquely to a single .pdf file
Validation	:	
Messages	:	
Exits	:	An dynamically created HTML file and .pdf files
Synchronization	:	Should be possible at the same time when the users are accessing the database in the form of queries
Constraints	:	Only the information present in the .pdf file will be available to the user. No additional information will be provided
Refer	:	Figure – 34



**Figure 34: Retrieve appropriate Book Detail**

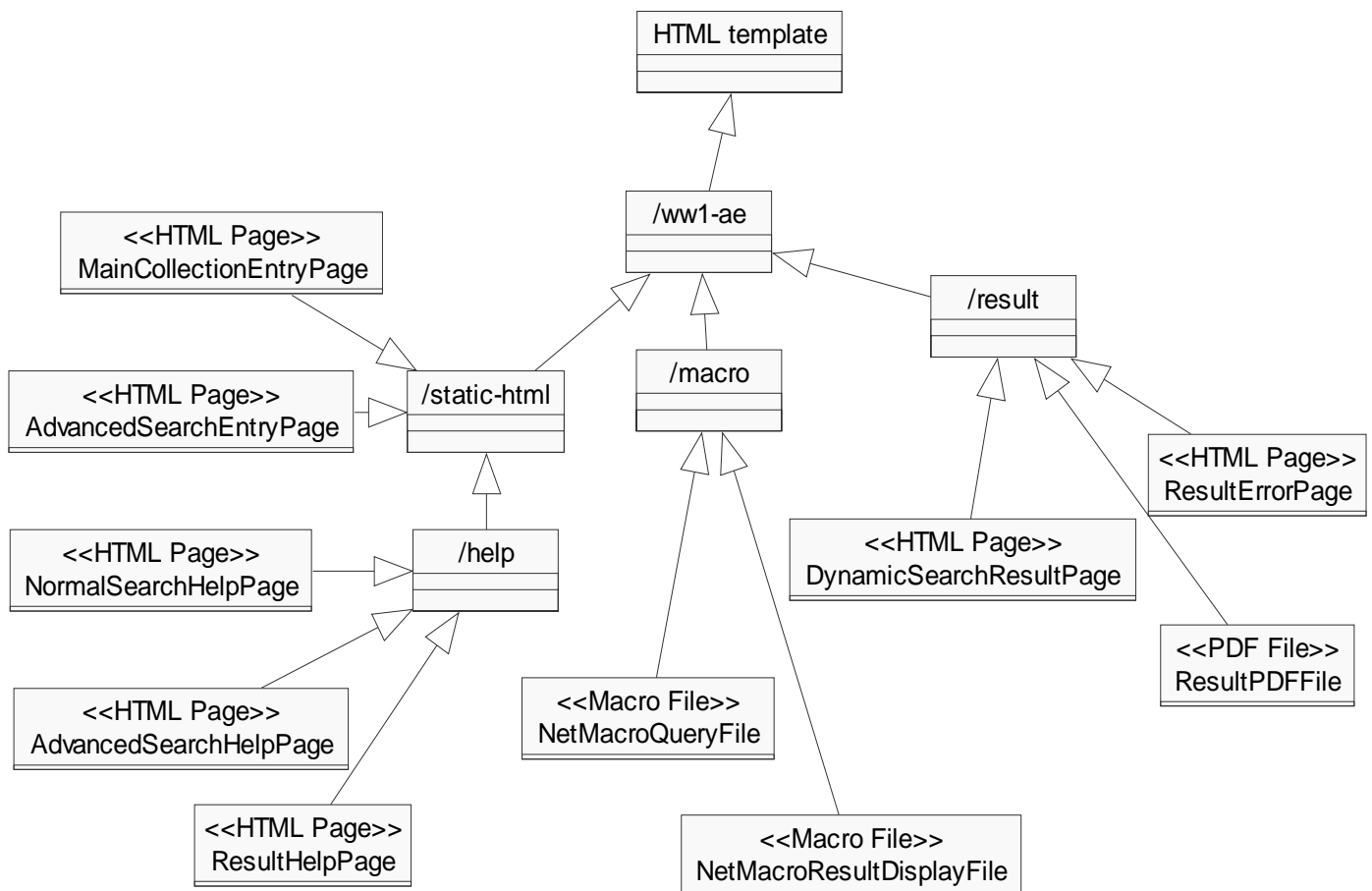
### 3.3.2.11 Administrator selects the help option

Identity	:	OPER-11
Event	:	Administrator selects the help option
Initiator – Policy	:	When the administrator/reference librarian selects this option, a detailed help screen page should be displayed which would explain all the features which that particular screen(e.g. main menu, application offers along with some helpful hints)
Passed Parameters	:	
Return Values	:	A help file which displays the help information

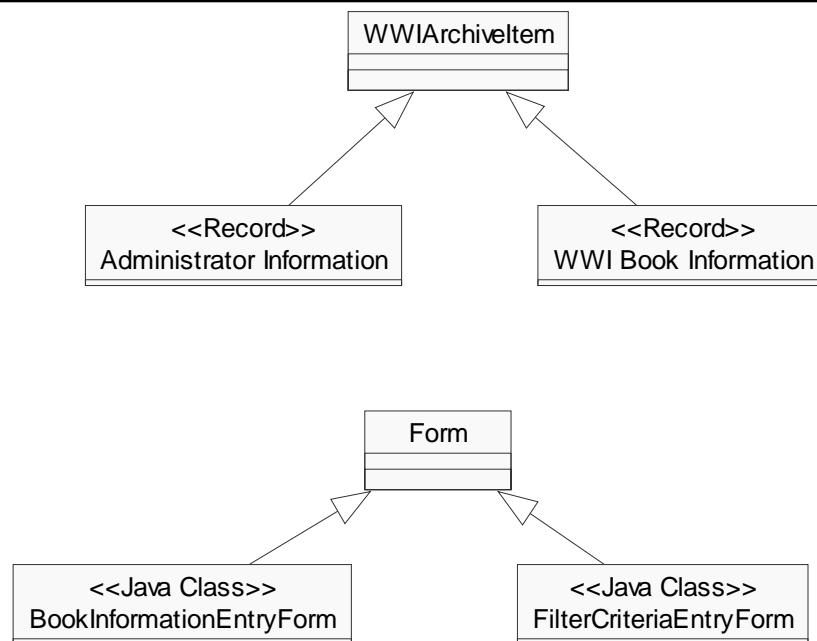
Exception Handling	:	An error box stating an error in trying to open the help file
Guards	:	
Validation	:	
Messages	:	
Exits	:	
Synchronization	:	Should be able to open along with a number of other windows
Constraints	:	

### 3.4 Class Model

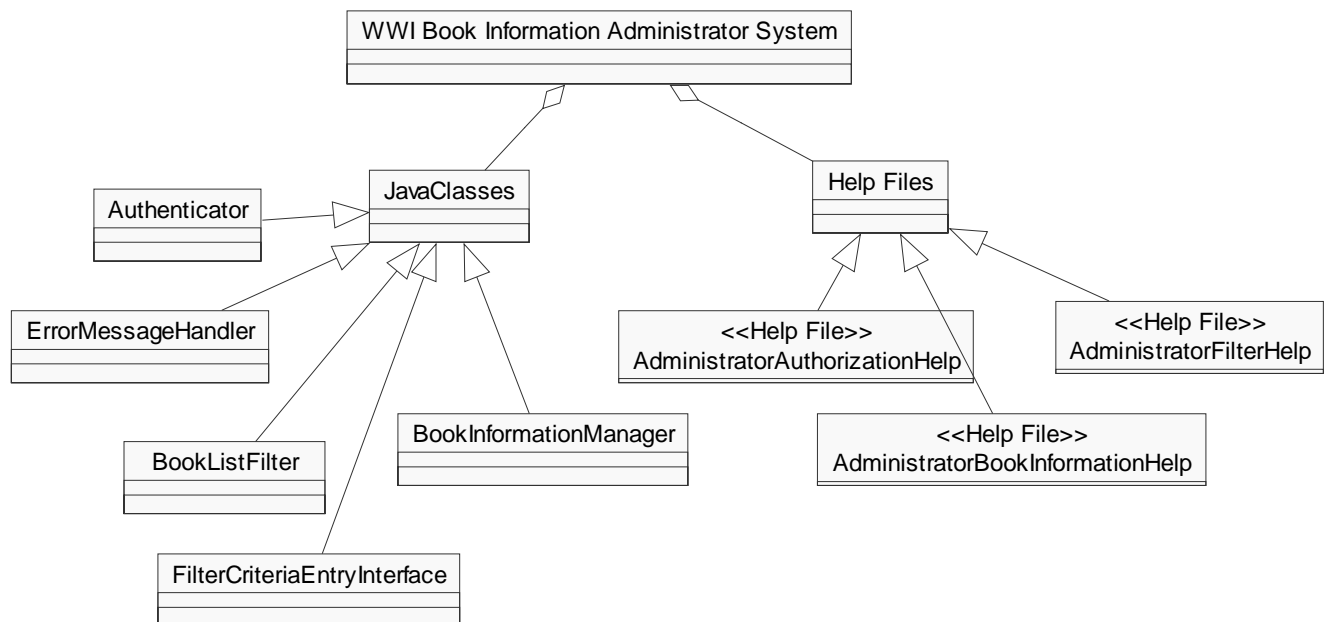
The Class Model is a refinement of the enterprise Model (SSAD 2.3) that we have described. The Class model is consistent with the Object Model (SSAD 3.2) and the Operations Model (SSAD 3.3). The class model takes all the objects from the Object Model and creates classes for them.



**Figure 35: Class Model 1**



***Figure 36: Class Model2***



***Figure 37: Class Model3***

## 3.5 DataModel

### 3.5.1 Structure of the WWI Book Information Archive

The contents of each WWIBookInformationItem is described below

Field	Type	Description
Title	String	Name of the World War I Book
Author(s)	String	Name of the authors
Abstract	String	The abstract is stored as a single memo field and is fully searchable.
TableofContents	String	Fully searchable. The Table of Contents is scanned and the text extracted from it. This text can directly be pasted into this field.
Index	String	Fully searchable. Same approach as for the Table of Contents.
PDFfilexx		A pdf file which will contain all of the above information and which will be displayed to the user.

### 3.5.2 Files

#### Storing of files on the Lotus Domino Web Server

*/ww1-ae* - Root directory corresponding to files of our project

*/static-html* - Contains all the help pages and other html pages which have no embedded macros

*/macro* - Macro files

*/temp* - Used for temporary processing -especially while creating dynamic web pages

#### The files in the system will be in the following manner:

##### Users Machine:

1) A **.exe** file which will launch the web browser and take the user to the World War I Access Enhancement web page. This file will also be available on this web page which will install the application.

##### Administrator's Machine

1) A standalone Java application (a **.exe** file) which will load the administrator's application

### *3.5.3 Data Organization*

The files for the team (team13b) in the course CS577b are organized as follows:  
<http://www.nunki-usc.edu:8082/team13b/index.html> – the index file of the team web page

../RLCA/ - contains all the directories for all the artifacts for the LCA milestone

../RLCA/OCD – contains the Operational Concept Documents

../RLCA/SSRD – contains the System and Software Requirements Description documents

../RLCA/SSAD – contains the System and Software Architecture Description documents

../RLCA/LCP – contains the Life Cycle Plan documents

../RLCA/FRD – contains the Feasibility Rationale documents

../RLCA/MDL – contains all the rational rose files

../RLCA/PROTO – contains the subdirectories which contain the different versions of the prototype

../RLCA/COCOMO – contains the COCOMO II data files

## 4. System Analysis Common Definition Language

**Imprint** -- A publisher's name, date and place of publication which are printed at the bottom of the title page HOMER USC's online book catalog.

**UML** -- The Unified Modeling Language (UML) is considered the de facto standard object modeling language in the industry. The UML is the evolution of early approaches to object-oriented analysis and design.

**Administrator** -- A person who is in charge of the overall management of the World War I – Access Enhancement application.

**Users** -- People who use the World War I – Access Enhancement application to get information about the World War I books present in the VKC library

**IBM Digital Library (IBM DL)**– The details of each book will be kept in the Information Store.

**Records** – Form in which the information about the World War I books will be stored in the Information Base.

## 5. System Design Common Definition Language

**Java** -- This system is designed for multi platform so Java is appropriate language for designing this system. Java is named after the Indonesian Island, a source of programming fluid. A simple, object-oriented, general-purpose programming language developed by Sun Microsystems in 1995. The Java libraries provide portable interfaces. For example, there is an abstract Window class and implementations of it for Unix, Microsoft Windows and the Macintosh.

**HTML** – HTML stands for HyperText Markup Language, the major language of the Internet’s World Wide Web. Web Sites and Web Pages are written in HTML. With HTML and the WWW, we have the ability to bring together text, pictures, sounds, and links... all in one place! HTML files are plain-text files, so they can be edited on any type of computer... IBM, Mac, UNIX, whatever.

**URL** -- Every single thing you see on the Web has its own distinct address, or URL. Uniform Resource Locators or URLs are the addresses used to locate these files. The Information contained in a URL gives us the ability to jump from one location on the Web to another with just a click of your mouse. Most web browsers allow us to type in a URL to access a particular document or service.

**Browser** -- A browser is software, just like a word-processing or spreadsheet program, which enables us to see Web pages.

**Pentium** – A type of microprocessor which is an essential part of any computer.

**PC** – Short form for a personal computer

**RAM** – Random Access Memory, which is an integral part of the computer.

**Mbytes** – Mega bytes , an measure of the size of RAM

**Windows 95/NT** – An operating system, which acts as the interface between the user and the hardware of the computer

**WWW** – (World Wide Web) A set of specifications (protocols) that allows the transmission of web pages over the Internet.

**JDBC** -- JDBC (Java Database Connectivity) is an application program interface (API) specification for connecting programs written in Java to the data in popular databases. The application program interface lets you encode access request statements in structured query language (SQL) that are then passed to the program that manages the database. It returns the results through a similar interface.

**ODBC** -- An application can submit statements to ODBC using the ODBC flavor of SQL. ODBC then translates these to whatever flavor the database understands. It stands for Open Database Connectivity.

**Graphical User Interface (GUI)** - An interface between the user and the computer that has pictures as well as words on the screen. Examples of GUIs include the Macintosh operating system (Mac OS), Microsoft Windows, and the applications that run under the aforementioned systems.

**Java Digital Library API** --An Application Programming Interface which supports direct access to the DB2 Digital Library Database by Java programs.

**API** --Application Programming Interface

**DB2** -- IBM's object database used for the Digital Library

**Lotus Domino Web Server** -- The web server running IBM-AIX operating system, which is the web, interface to the DB2 Database.

**NET.DATA** -- IBM's scripting language for web access to the Digital Library

**Dynamic HTML** -- HTML pages that are dynamically generated by the Net.Data macros.

**IBM Digital Library** -- The IBM Digital Library is a DB2 based object database management system for handling large amount of multimedia information. It provides a fast hardware framework for handling a large amount of database related query processing.

## 6. Appendix

### 6.1 Vendor Documents

- HOMER, the online catalog, uses Sirsi Corporation's Unicorn Collection Management System <http://www.sirsi.com>
- Documentation for IBM Digital Library <http://www.software.ibm.com/is/dig-lib>
- Documentation for Digital Library <http://www.usc.edu/~smith/DL/>
- Documentation for Net.Data <http://www.software.ibm.com/data/net.data/>