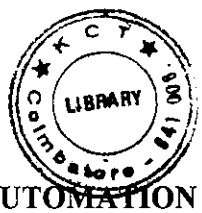

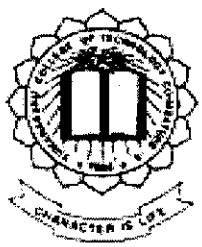

BUSINESS PROCESS AUTOMATION FOR CREDIT CARD

By

Senthil Kumar C
Registration Number: 71205621043

Of
Kumaraguru College of Technology, Coimbatore

A PROJECT REPORT
Submitted to the

FACULTY OF INFORMATION AND COMMUNICATION ENGINEERING

In partial fulfillment of the requirements
for the award of the degree

of

MASTER OF COMPUTER APPLICATION

ANNA UNIVERSITY
CHENNAI 600 025

June 2008

BONAFIDE CERTIFICATE

Certified that this project report titled **Business Process Automation for Credit Card** is the bonafide work of **Mr. Senthil Kumar C.** (Registration Number:71205621043) who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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Submitted to Project and Viva Examination held on 01/07/2008

Internal Examiner 1/7/08

External Examiner 1/7/08

WIPRO
Applying Thought

April 23, 2008

PROJECT COMPLETION CERTIFICATE

This is to certify that **Mr. Senthil Kumar C** bearing trainee id no. 748275 student of final semester MCA from **Kumarguru College of Technology, Coimbatore** bearing **Roll no. 05MCA43 (71205621043)** has completed the project titled **Business Process Automation for Credit Card** at Wipro Technologies, EC4, T-17, First Floor, C wing, Bangalore 100 under my guidance from December 10, 2007 to April 24, 2008 for academic requirements of his post graduation. We have observed that his work has been excellent and appreciate his sincere learning. He has performed the project with energy and enthusiasm.

I wish him all the best for all his future endeavors. This letter is issued based on his request.

for **Vivek Srivastava**
Project Manager

ABSTRACT

The company's have a large amount of content data that needs to be stored safely and managed effectively within the company's business processes.

From application processing through dispute resolution, speed and accuracy are paramount in the credit card industry. Whether dealing with demanding customers or federal regulatory deadlines, financial institutions have found that their existing systems do not have sufficient automation or connectivity to enable optimal performance in today's fast-paced market.

Business Process Automation for Credit Card is an Enterprise Content Management (ECM) solution that enables credit card providers to reduce cycle time and improve accuracy in the application process, provide timely access to electronic documents and images and streamline case management in fraud and dispute resolution.

With this solution the credit card providers can make better decisions in a timelier manner, while fast response to customer inquiries and disputes can strengthen customer loyalty.

ACKNOWLEDGEMENT

I expressed my profound gratitude to **Dr. Joseph.V.Thanikal**, Kumaraguru College of Technology, Coimbatore for giving me an oppurtunity to work on the project.

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I extend my sincere thank to my parents, friends and the Almighty for providing me courage and moral support in completing the project work successfully.

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LIST OF ABBREVATIONS

ECM – Enterprise Content Management

BPF – Business Process Framework

BPM – Business Process Management

JSP – Java Server Page

ERP – Enterprise Resource Planning

MVC – Model View Controller

NPD – New Product Development

NPI - New Product Information

IDE – Integrated Development Environment

JDT – Java Development Tools

UML – Unified Modeling Language

CHAPTER I

1. INTRODUCTION

The Enterprise Content Management (ECM) is the technologies used to capture, manage, store, preserve, and deliver content and documents related to organizational processes. This Solution is designed to handle the heavy demands of large enterprise content.

The idea behind **"Business Process Automation for Credit Card"** is to make files available inter-office, as well as over the web. It can help us create a paperless business process solution.

1.1 ORGANIZATIONAL PROFILE

Wipro Technologies was established in the year 1980 by Azim H. Premji. It was the first Indian Company to embrace Six Sigma, the first Software Services Company in the world to achieve SEI CMM Level 5 and it also became the world's first organization to achieve PCMM Level 5 (People Capability Maturity Model) and the first outside USA to receive the IEEE Software Process Award.

Wipro has more than 70,000 employees providing solutions to more than 600 reputed clients spread across the world including IBM, Sony etc. Its employees are its biggest asset. Wipro has one of the best HR practices in the global IT industry.

It has established itself as one of the most reputed leaders amongst the providers of integrated business, technology and process solutions on a global delivery platform. The services and solutions offered by Wipro include IT services, consulting services, product engineering solutions, technology infrastructure and business process outsourcing services.

1.2 PROBLEM DEFINITION

Unstructured content at most organizations is increasing at a phenomenal rate and is resulting in information that is lost, repeated, and/or out-of-date. This uncontrolled growth undermines your business's ability to achieve the following:

- **Compliance** — Virtually all organizations are now legally compelled to securely store and access various content for a defined period of time. ECM enables you to set policies for retaining, storing, and retrieving specific content and mitigate the risk of noncompliance.

- **Collaboration** — Content managed in departmental silos and restricted to certain geographies prevents distributed teams to share information. As a result, productivity drops and time-to-market slows. With ECM, people can create, capture, and distribute collaborative content on the tightest timeline.

- **Content ROI** — Employees can waste up to 40% of their workday searching for content and wrestling with versioning, ownership, and reformatting issues. As a result, expensive information goes underused or must be recreated. ECM provides the infrastructure that allows you to control your content.

- **Consolidation** — An ECM system, which uses a single infrastructure rather than several silo style content systems, dramatically drops overall costs and increases security. An ECM repository that can scale to over a billion objects offers a transaction response time of less than a second.

Compliance

The world is becoming more regulated. Whatever your industry sector, regulations are more stringent than ever before. These regulations are legally enforced or a best industry practice, the need to provide processes around content and documents is vital. This drives the need to store specific pieces of content that are either valuable and/or admissible in secure, unchangeable storage environments for a defined period of time. Document management and records management provide the structure to define policies associated with content, and by adding to them an addressable storage system, those policies can be enforced, guaranteeing immutability and authenticity.

Collaboration

Organizations also want systems to make a difference. They need to enhance the rate of innovation, accelerate new product development (NPD) and new product introduction (NPI) processes, and discover and access new channels to market. Collaboration allows the participants in a business process to come together to optimize the process to mutual benefit. Working in harmony with BPM or workflow, collaboration is becoming increasingly important in organizations as it brings partners, suppliers, customers, and agencies together in a controlled way and manages and leverages collaborative content such as discussion threads, voting results, and documents.

Content ROI

According to research, unstructured content is growing at anywhere between 65 percent and 200 percent per annum depending on industry sector. It is also estimated that nearly 800 MB of data or content is produced per person each year. Organizations are drowning under a sea of content. They are unable to classify a piece of information as high value or a waste of space; as the latest version or the second draft; as under the author's control or the team's vision; as important to one specific department or to several; as mid-way through its lifecycle or as "missing in action". Thus, many organizations are not able to use and reuse important content efficiently and effectively. ECM provides an infrastructure that enables you to address these issues and get your content under control.

Consolidation

Supporting content management systems that are in departmental or geographical silos across your organization are making costs skyrocket. The same information is being created two or three times because it cannot be shared or no one else knows it exists. In addition to solving these problems, an ECM system also allows you to manage digital content (graphics) on your Website, archive only essential e-mail, and manage collaborative content among other key business processes.

The bottom line is if your organization deals with paper-intensive business processes, such as insurance, government, and financial services organizations or relies heavily on e-commerce transactions, distribution of information through your Website, group collaboration, or electronic publishing and delivery of content, you need the broad capabilities of ECM, which includes Web content management and multi-channel publishing capabilities.

CHAPTER II

SYSTEM ANALYSIS

System analysis involves an orderly, structured process for identifying and solving problems. It involves study of the current system in detail and to find out how it works and where the improvements have to be made. Analysis is a phase that determines what is to be done for software development.

The steps involves in this are

- Identify the limitations of the existing system
- Identify the need for proposed system

2.1 EXISTING SYSTEM

The existing system was used to record the Credit card Application details. The files related to the clients were filed and kept. The hard copy was only maintained. The verifications of the files are done manually. The request was submitted to the clerk and it was forwarded to the manager. After verification the card is been dispatched customer. The file is closed after the payment is done.

Disadvantages of the existing system

The disadvantages of the existing system are as follows

- **Store Documents:** - The documents were filed and stored as hardcopy. This in turn made search, retrieve and view of the document very complicated.
- **No Centralization:** - The documents which are stored in various business units were very difficult to access.
- **Time consuming:** - The time and costs associated with employees searching and filing paper documents were very high.
- **Security:** - There was no security for the documents.

2.2 PROPOSED SYSTEM

The proposed system is used to provide proper managements of Credit card applications. The process starts with the customer requesting for a credit card. The officer may accept the proposal and make further verification of the customer. The process is finalized with the concern (cover note, policy, certificate of acceptance) as well as consideration (i.e. approval for credit).The proposed system has the following steps

- A request is made by the customer to the clerk
- The customer fills the application form and submits it to the clerk for entering it into the system
- The documents required for the process are also submitted to the clerk
- The documents submitted are scanned and stored
- A request is send from the clerk to the manager with the application form and the scanned documents
- Verification is done in order to check whether the documents are correct.
- The Credit card is finally dispatched.

Advantages of the proposed system

The main idea of the proposed system is to create a paperless office where all the documents are in electronic form and accessed from any place in the globe.

- **Software Product:** - Filenet p8 workplace provides effective content management and process management.
- **Indexing:** - The documents can be indexed for easy retrieval of documents.
- **Store Documents:** - The documents are scanned and stored. This can in turn help the system to search, retrieve, view and print the documents. Cabinet where paper files are stored can be removed since all the files are electronic documents.
- **Workflow:** - with the help of workflow the overall architecture of the system is designed depending up on the business.
- **Centralization:** - The documents can be stored in a centralized repository and accessed throughout the business unit.

2.3. USER INTERFACE REQUIREMENTS

The user interface is the key to application usability. The application should include content presentation, application navigation, and user assistance.

The interface has several JSP pages comprise an application. This application design should include backward and forward links between pages. An application "home page" might link to all other pages in the application and provides an appropriate place for notifying users of application features and enhancements.

The web application is been designed in such a way that the user can accomplish the task with the maximum of three clicks.

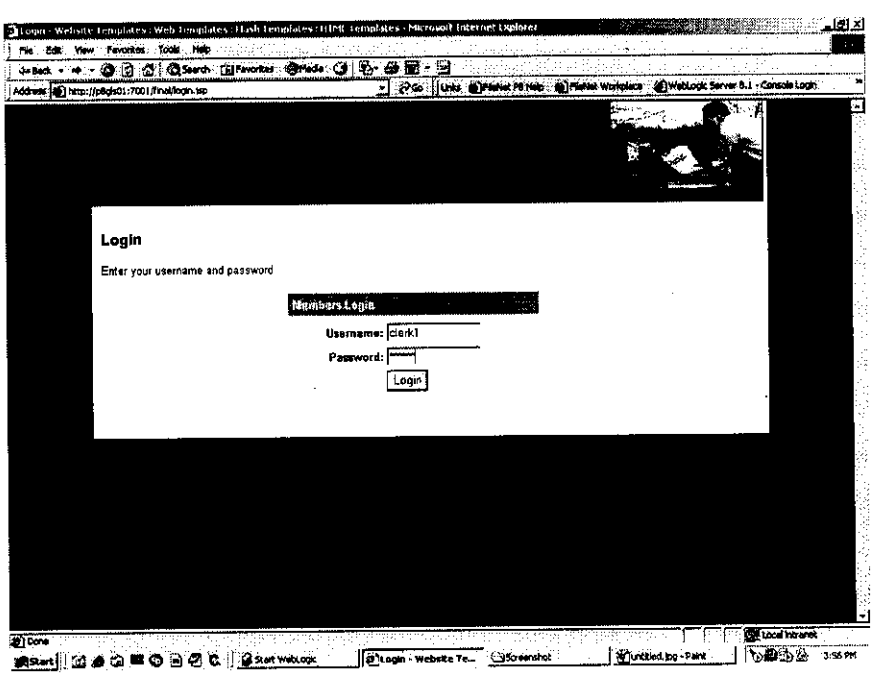


Figure 2.3.1 Login Interface Design

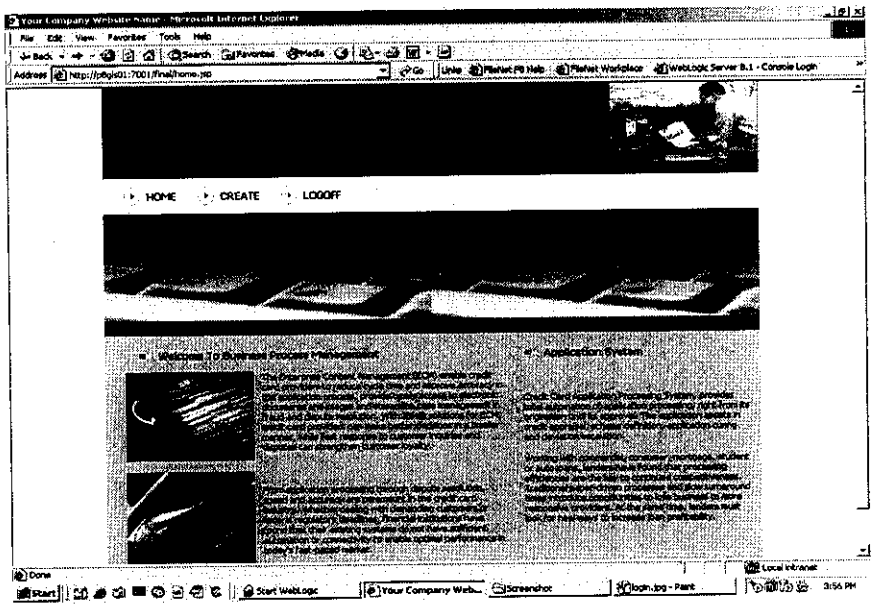


Figure 2.3.2 Home Page Interface Design

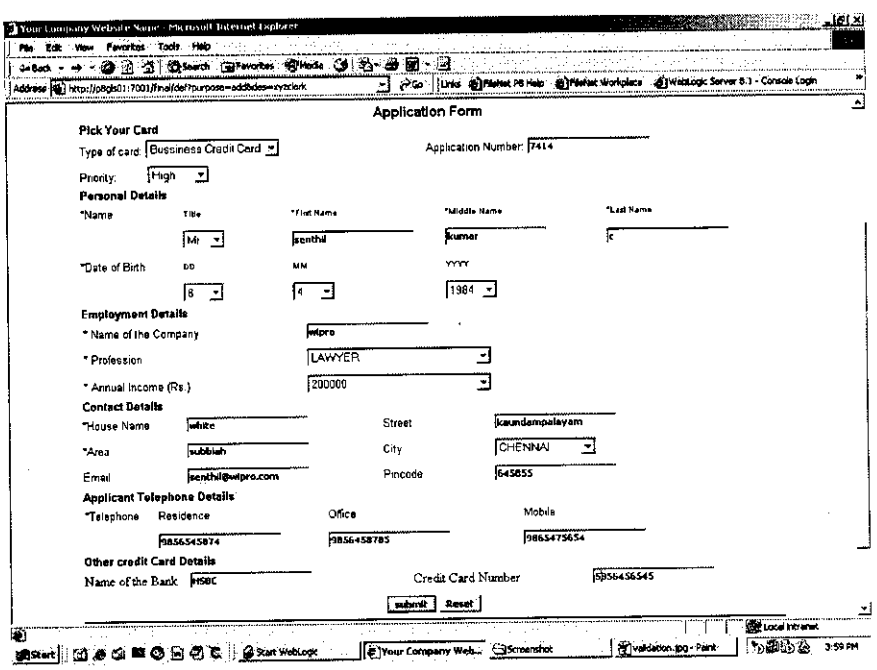


Figure 2.3.3 Application Form Interface Design.

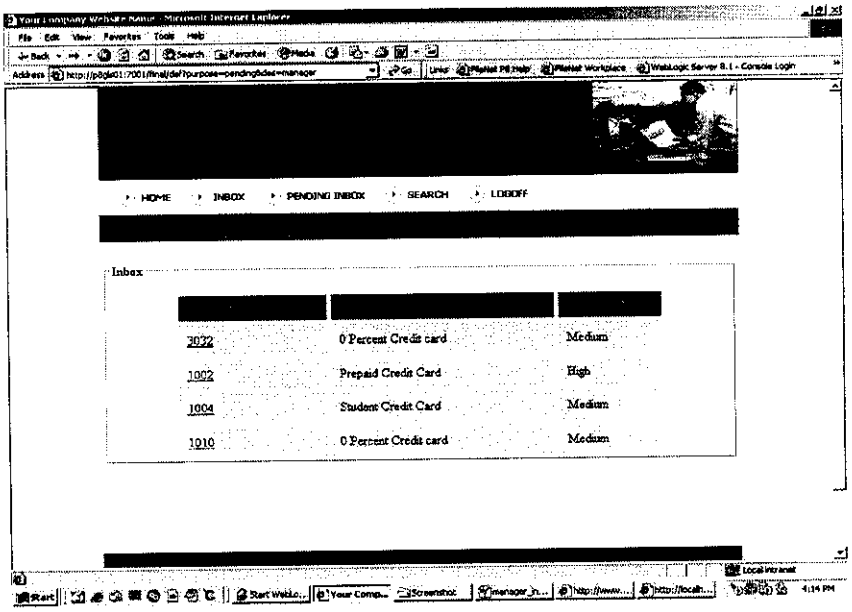


Figure 2.3.4 Display Work Item Interface Design.

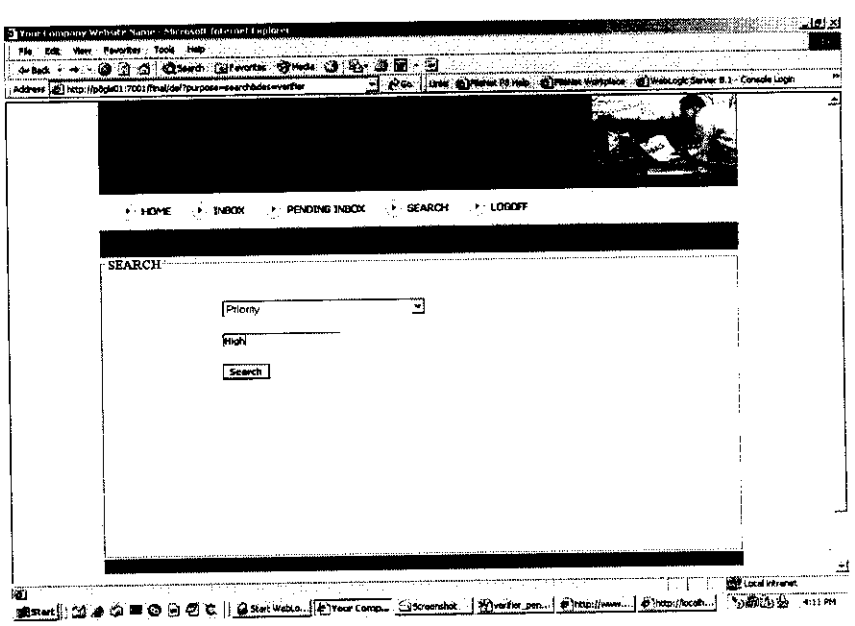


Figure 2.3.5 Search Work Item Interface Design.

CHAPTER III

DEVELOPMENT ENVIRONMENT

This chapter deals with the software and hardware specification used for the project. This chapter also describes the software used for the creation of this project.

3.1. HARDWARE SPECIFICATION

Processor	: Intel Pentium
RAM	: 2GB
Hard Disk Drive	: 80MB
Floppy Drive	: 1.44 MB
Display Device	: LCD Color Monitor
Keyboard	: Standard keyboard
Mouse	: Standard Mouse

3.2. SOFTWARE SPECIFICATION

Operating System	: Windows NT
Programming language	: Java
Scripting language	: Java Script
Framework	: FileNet p8, MVC (Model, View, Controller)
Package (IDE)	: Net Beans 5.5, Eclipse
Web Language	: JSP, HTML
Database	: MS SQL Server 2005.
Server	: Web Logic

ABOUT THE SOFTWARE

P-2291

Windows NT Server

Windows NT is a family of operating systems produced by Microsoft, the first version of which was released in July 1993. It was originally designed to be a powerful high-level-language-based, processor-independent, multiprocessing, multi-user operating system with features comparable to UNIX. It was intended to complement consumer versions of Windows that were based on MS-DOS. NT was the first fully 32-bit version of Windows, whereas its consumer-oriented counterparts, Windows 3.1x and Windows 9x, were 16-bit/32-bit hybrids. Windows 2000, Windows XP, Windows Server 2003, Windows Vista, Windows Home Server, and Windows Server 2008 are based upon the Windows NT system, although they are not branded as Windows NT.

FileNet P8

The FileNet P8 family of products includes back-end services, development tools, and applications that address enterprise content and process management requirements. FileNet P8 Platform provides the baseline components for enterprise content management solutions, including Content Engine, Process Engine, Application Engine, and Rendition Engine. These components address enterprise content management (ECM) and business process management (BPM) requirements. Additional components can be added to a system to enable additional capabilities. Additional components can be added to a system to enable additional capabilities.

Content federation capabilities for accessing enterprise-wide content are Content Federation Services for Image Services, which enable applications built on the P8 Platform to natively access, IS documents. Records Manager, FileNet P8 eForms, Email Manager, Capture, Process Analyzer, Process Simulator and Image Services Resource Adapter can be purchased for additional licensing fees. The FileNet P8 Portlets

component is made available at no extra cost and includes BEA WebLogic Portlet and IBM WebSphere Portlet. FileNet P8 Platform includes Content Engine, Process Engine, Application Engine, and Rendition Engine.

Eclipse

Eclipse is an open-source Integrated development environment (IDE) written primarily in Java. In its default form it is meant for Java developers, consisting of the Java Development Tools (JDT).Eclipse employs plug-ins in order to provide all of its functionality on top of (and including) the rich client platform, in contrast to some other applications where functionality is typically hard coded. The key to the seamless integration of tools with Eclipse is the plug-in.

WebLogic Server

BEA WebLogic is a J2EE platform product family that includes

- A J2EE application server, WebLogic Application Server
- An enterprise portal, WebLogic Portal
- An Enterprise Application Integration platform
- A transaction server and infrastructure, WebLogic Tuxedo
- A telecommunication platform, WebLogic Communication Platform
- A HTTP web server

BEA WebLogic Server Process Edition also includes Business Process Management and Data Mapping functionality.

Edit Plus

Edit Plus is a 32-bit text editor for the Microsoft Windows operating system, developed by Sangil Kim of ES-Computing. The editor contains tools for programmers, including syntax highlighting (and support for custom syntax files), file type conversions, line ending conversion, regular expressions for search-and-replace, keystroke recording, spell check, full support for Unicode editing, customizable keyboard shortcuts, auto-completion, code folding, and more. Files can be browsed and edited in tabs, and an internal file browser is implemented in the software.

Front-End Tools-JSP

Java Server Pages (JSP) is a Java technology that allows software developers to dynamically generate HTML, XML or other types of documents in response to a Web client request. The technology allows Java code and certain pre-defined actions to be embedded into static content. JSPs are compiled into Java Servlets by a JSP compiler. A JSP compiler may generate a servlet in Java code that is then compiled by the Java compiler, or it may generate byte code for the servlet directly. Architecturally, JSP can be viewed as a high-level abstraction of servlets that is implemented as an extension of the Servlet 2.1 API.

Database - MySQL

MySQL is a multithreaded, multi-user SQL database management system (DBMS) which has more than 11 million installations. The program runs as a server providing multi-user access to a number of databases. Libraries for accessing MySQL databases are available in all major programming languages with language-specific APIs.

CHAPTER IV

SYSTEM DESIGN

4.1 CONTEXT DIAGRAM

A **System Context Analysis Diagram** is the highest level view of a system, similar to Block Diagram, showing a (normally software-based) system as a whole and its inputs and outputs from/to external factors.

System Context Diagrams are used to display how systems inter operates at a very high level or how systems operate and interact logically. The system context diagram is a necessary tool in developing a baseline interaction between Actors and the systems.

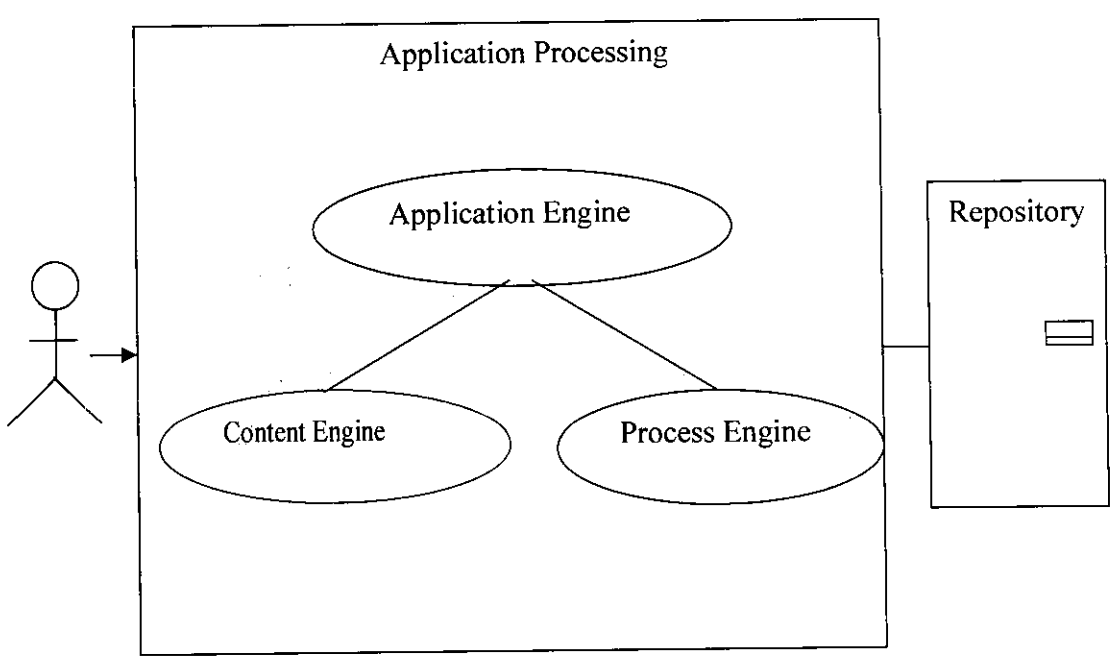


Figure 4.1.1 Context Diagram

4.2 USE CASE DIAGRAM

A **use case** is a description of a system's behavior as it responds to a request that originates from outside of that system.

A **use case diagram** is a type of **behavioral diagram** defined by the Unified Modeling Language (UML) created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals represented as use cases and any dependencies between those use cases.

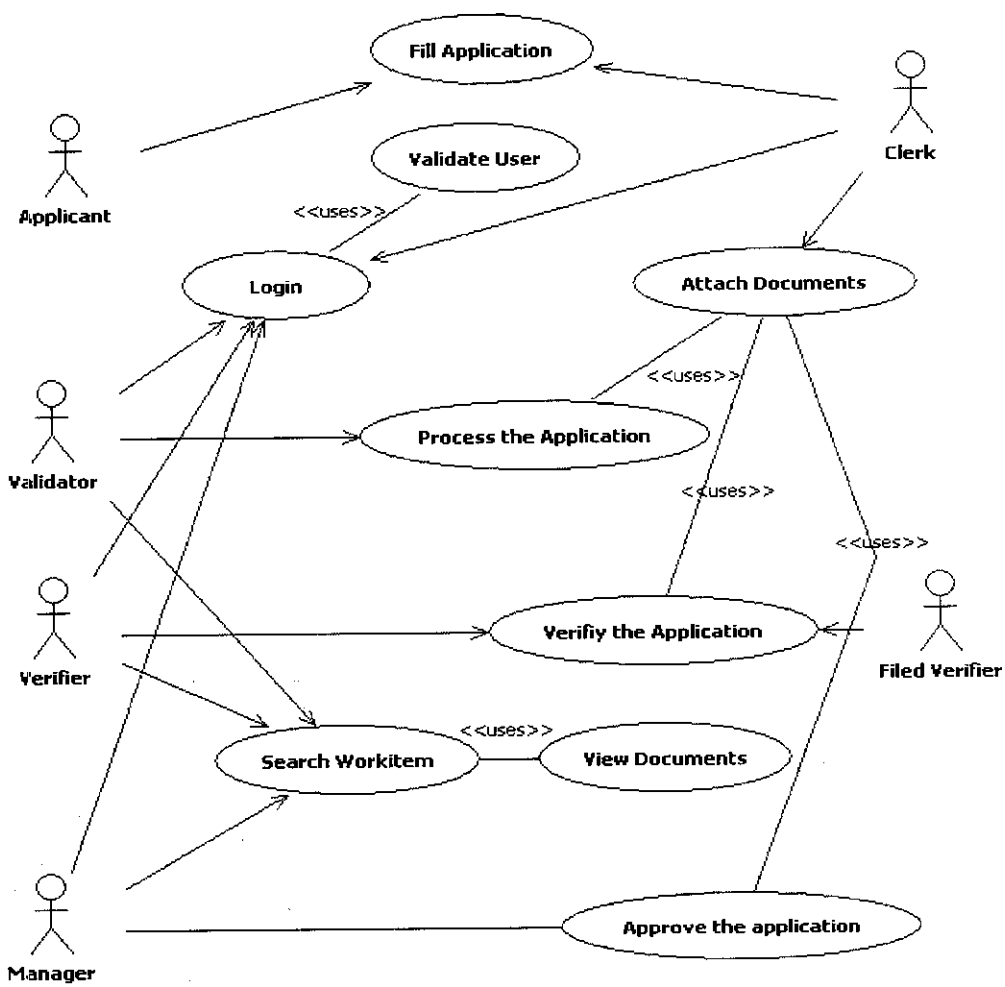


Figure 4.2.1 Use Case Diagram

4.2.1 USE CASE DOCUMENT

UC NO: 1 **LOG ON TO SYSTEM**

Goal:	When User logs on to System there is a need for the system to authenticate and authorize their user details.	
Preconditions:	• The User is not already logged on to the system. • The User is logged on to the Network. • User logon id is known.	
Success End Condition:	The User is logged on and presented with their default Inbox view displaying their authorized tasks and actions.	
Failed End Condition:	**Failure Condition**	**Outcome**
	• User does not have the correct Log On information. • User enters 3 incorrect passwords	• User cannot proceed past the Log On screen. • Adhere to Banking System standard procedures
MAIN SUCCESS SCENARIO	1. The use case starts when the User launches a Credit card browser session. 2. System prompts the user to enter password. 3. The User enters their standard System network password. 4. The system verifies the log on information using. 5. If the User entered invalid credentials the system will notify the User of the error and re-present the log on screen. 6. System checks for and unlocks any locked Work items. 7. If the User credentials are validated the system displays the User's default Inbox (this could be a personalized view of team Inbox.)	
EXTENSIONS	• At any time the User can select 'Cancel' and the system closes the browser session. • After 3 failed attempts, the system will notify user that their account is locked.	

UC NO: 2 CREATE APPLICATION

Goal:	The new Case is to be created and the created Work Item is to be allocated to the specified Inbox..
Preconditions:	• User has already logged onto the system
Success End Condition:	• The new Case is created and the created Work Item is allocated to the specified Inbox. • The system redisplays the previous View. • COGEN FileNet Flag set
MAIN SUCCESS SCENARIO	• The use case starts when the User selects 'Create'. • The User selects the process type to be created. • The system will display a Create New Case form based on the selected process type. • The User adds the data.
EXTENSIONS	• At any time before selecting 'Create New' the User can select 'Cancel' and the User is returned to the previous view

UC NO: 3 ADD DOCUMENTS

Goal:	Any manual content capture / internal report.
Preconditions:	• The User initiates this use case from the Document List view (i.e. the User must be in the detailed case view to see the Case Document List). • Invoked from any level of the System tree from within the system View
Success End Condition:	The File is added to the image repository and displayed in the refreshed Document List view.
MAIN SUCCESS SCENARIO	• The use case starts when the User selects 'Add Document'. (Content i.e. Excel, FileNet template). • The system will display an Add Document Form. • The User browses the network for the required file. (A dialogue window is displayed) • The User enters the Document Type & Category to classify the document being captured. • The User selects 'Add'. • The system will take a copy of the selected file and save in the Image Repository with indexes (i.e. Document Type & Category, Number, Capture Date/Time). • The system will refresh and return to the Document List view.
EXTENSIONS	At any time before selecting 'Add' the User can select 'Cancel' and the User is returned to the Document List view.

UC NO: 4 **DISPLAY INBOX**

Goal:	When User logs on to System there is a need for the system to display all work items.
Preconditions:	• User has already logged onto the system • System displays when user finishes work item
Success End Condition:	The selected Inbox and filtered content is displayed in default sort order.
MAIN SUCCESS SCENARIO	• The system will display the selected Inbox in the specified order.
EXTENSIONS	• The User selects a new WORK ITEM. • If the logged on Users role and the Inbox combination mean that the queue is set to 'get next' (as opposed to 'return to list'), then the system will open the next highest priority unlocked Work Item from the current inbox.

UC NO: 5 DISPLAY DOCUMENT LIST

Goal:	The document list should be displayed in the context of a case
Preconditions:	• The document list is displayed in the context of a case when the Display Case Information use case is selected. • Actor can select the document tab within Case view
Success End Condition:	The system displays the case document list and the default document selected and displayed in the image viewer window.
MAIN SUCCESS SCENARIO	• The use case starts when the Display Work Item Information use case is selected. • The system will display a list of all documents associated to current context within the case • The user selects document in the list • The system will use the Display Document use case to display the selected document in the image viewer window. • If the User selects another document from the document list the system will use the Display Document use case to display the document in the image viewer window.
EXTENSIONS	• If the user selects the Document List row New Window Icon, the system will launch a new independent floating viewer window to display the document.

UC NO: 6 **SEARCH CASE**

Goal:	The aim is to search for a particular case.
Preconditions:	• User has already logged onto the system
Success End Condition:	• The system displays the search results information or a nil result message.
MAIN SUCCESS SCENARIO	• The User selects 'Search'. • The system displays a search type select form in order for the User to select the type of search to be performed. • The User selects the Search Type and selects 'OK'. • The system displays a Search Form in order for the User to enter search information. • The User enters Search Criteria and select search. • The system returns search results • If the system finds no matches it will notify the User of the negative result
EXTENSIONS	At any time before selecting 'Create New' the User can select 'Cancel' and the User is returned to the previous view

UC NO: 7 **LOGS OFF**

Goal:	When User logs off of the system, there is a need for the system to cleanly log the user off.
Preconditions:	The User is logged on to the system.
Success End Condition:	The system closes all open sessions and logs the user off.
MAIN SUCCESS SCENARIO	• The use case starts when the User selects 'Log Off'. • The system prompts the User to confirm they wish to Log Off. • The User selects 'Log Off'.
EXTENSIONS	• The User selects 'cancel'. • The system returns the User to previous view.

4.3 WORKFLOW DIAGRAM

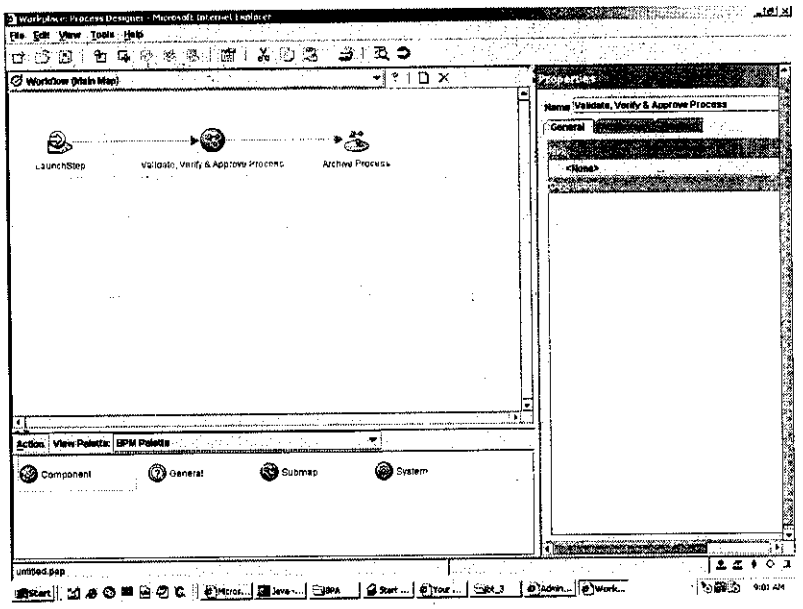


Figure 4.3.1 Workflow Level 0

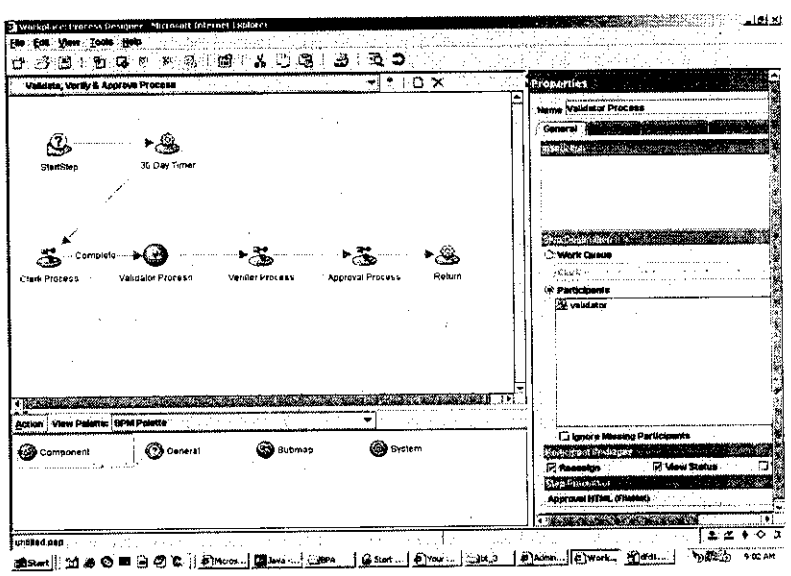


Figure 4.3.2 Workflow Level 1

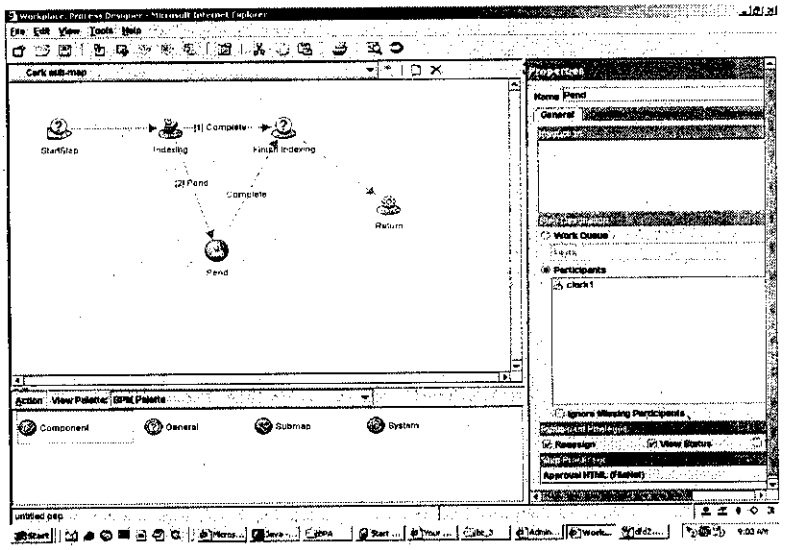


Figure 4.3.3 Workflow Level 2

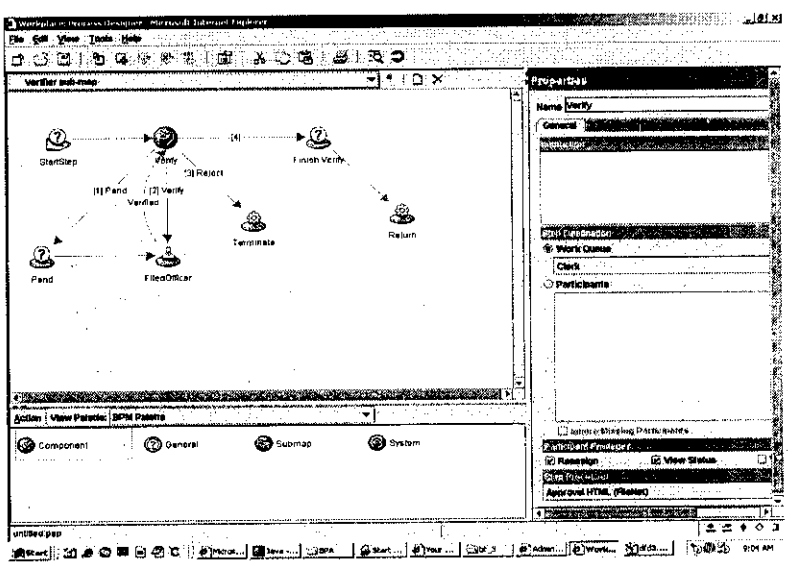


Figure 4.3.4 Workflow Level 3

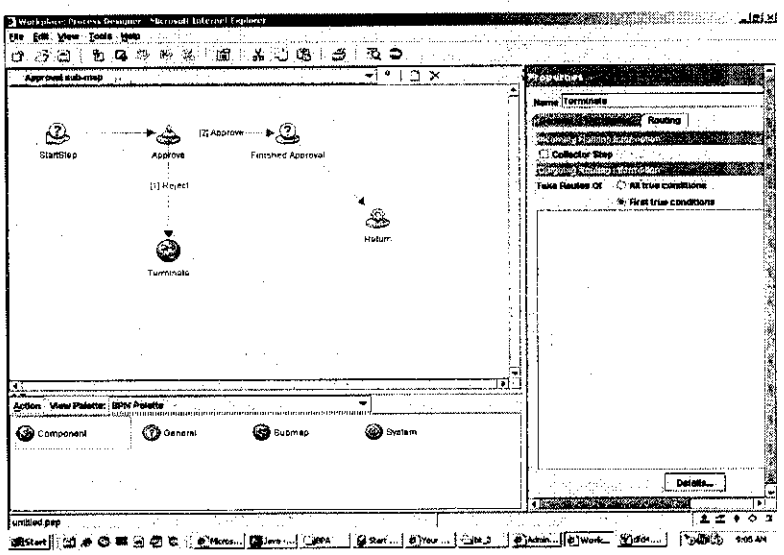


Figure 4.3.5 Workflow Level 4

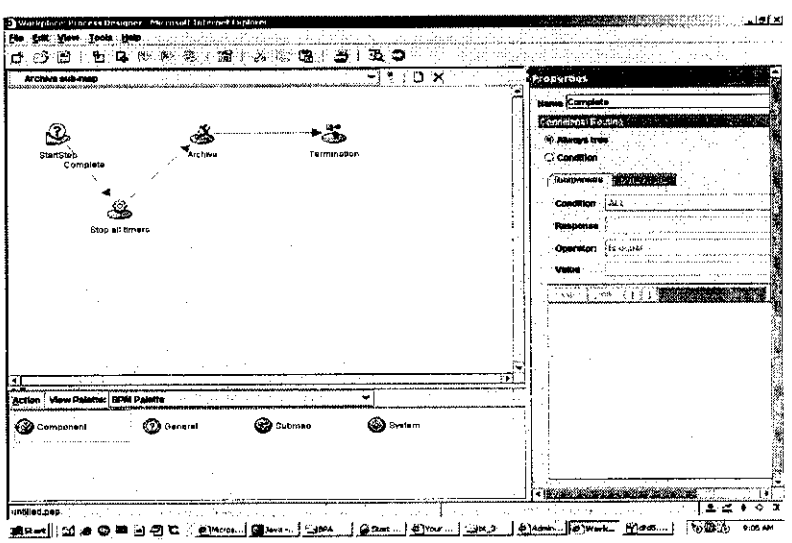


Figure 4.3.6 Workflow Level 5

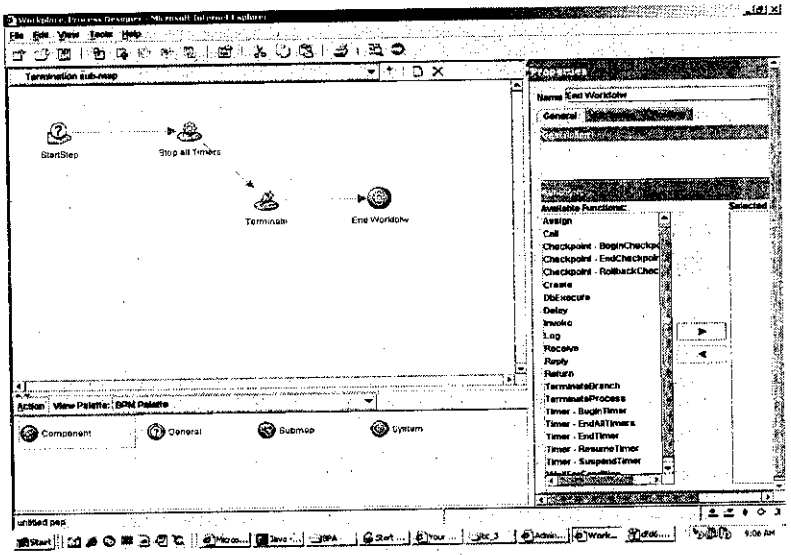


Figure 4.3.7 Workflow Level 6

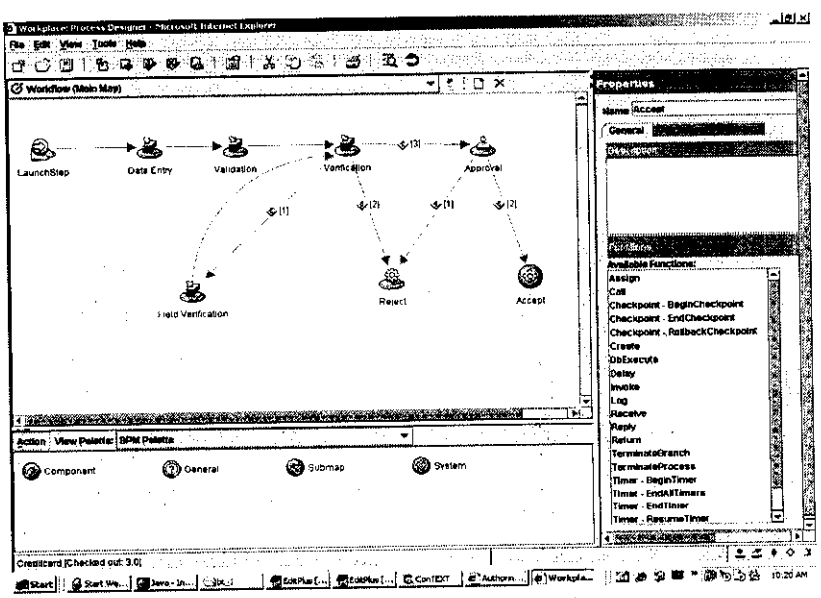


Figure 4.3.8 Main workflow

4.4 INTERACTION DIAGRAM

An Interaction diagram models the interactions between objects or parts in terms of sequenced messages.

4.4.1 Sequence diagram

A sequence diagram shows, as parallel vertical lines, different processes or objects that live simultaneously, and, as horizontal arrows, the messages exchanged between them, in the order in which they occur. This allows the specification of simple runtime scenarios in a graphical manner.

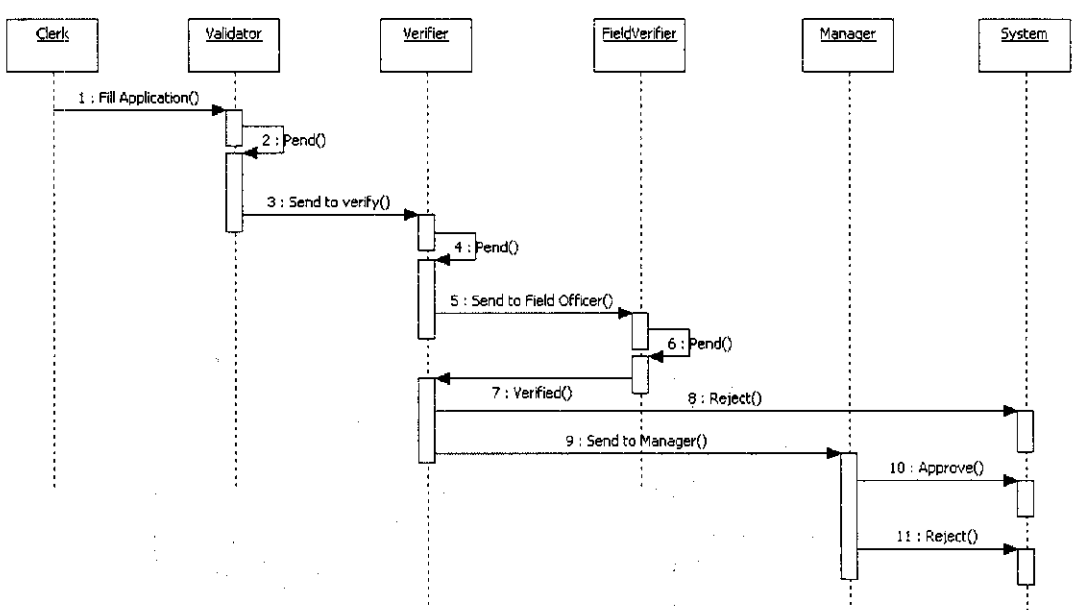


Figure 4.4.1 Sequence diagram

4.4.2 Collaboration diagram

This diagram expresses a single scenario like the sequence diagram, but in this case the focus is not on time but rather object instances. It still contains ordered messages between objects but in a collaboration diagram you can position the object instances anywhere, and better express a combination of structural and behavioral concepts.

Collaboration diagrams show the sequence by numbering the messages on the diagram. This makes it easier to show how the objects are linked together, but harder to see the sequence at a glance.

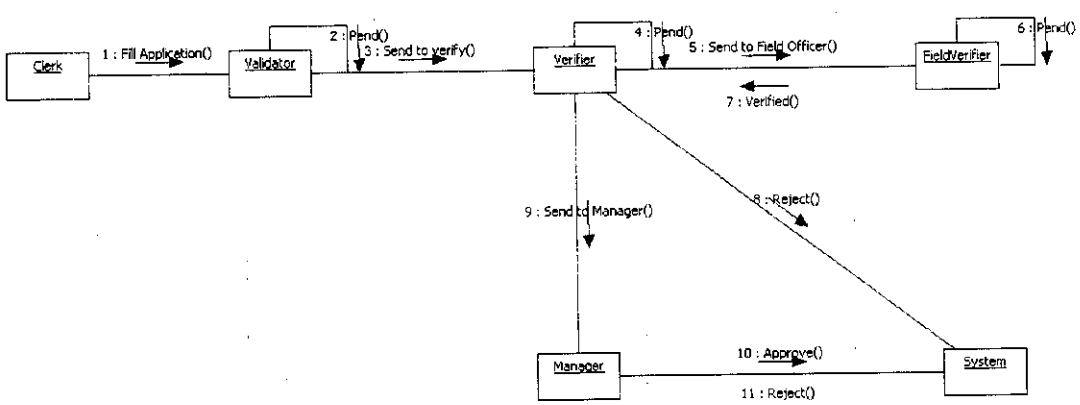


Figure 4.4.2 Collaboration diagram

4.5 ACTIVITY DIAGRAM

Activity diagram is a flow chart on steroids. This diagram is great for expressing process flow.

It describes the workflow behavior of a system. Activity diagrams are similar to state diagrams because activities are the state of doing something. The diagrams describe the state of activities by showing the sequence of activities performed. Activity diagrams can show activities that are conditional or parallel.

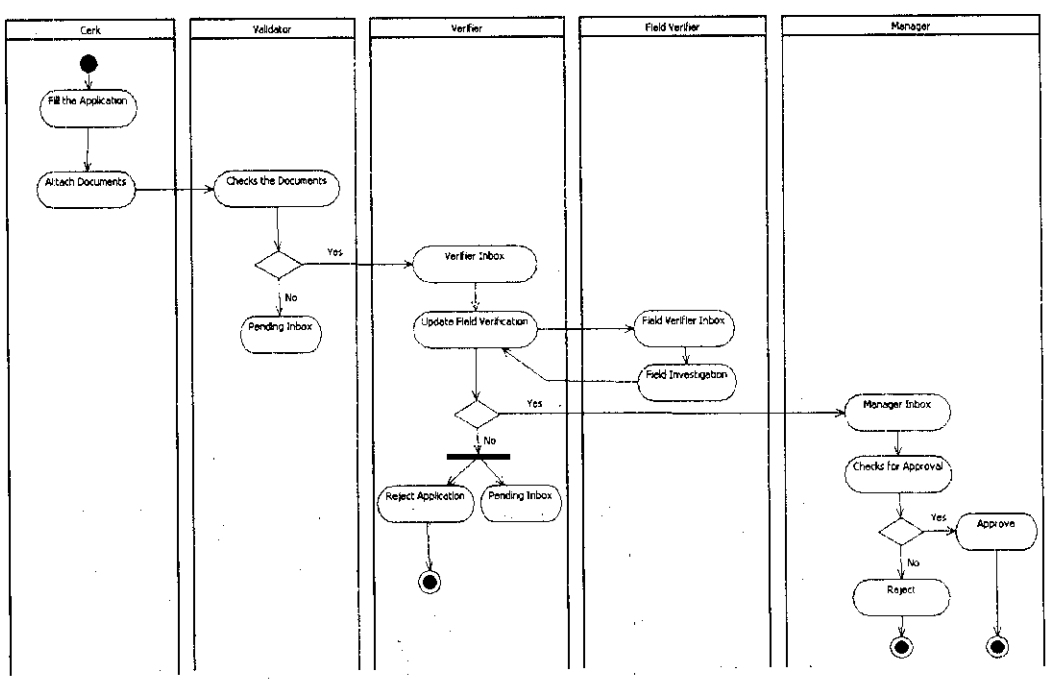


Figure 4.5.1 Activity diagram

4.6 CLASS DIAGRAM

Class diagram shows structural relationships between classes and interfaces. These diagrams peek into the underlying structure of the classes in the system. Much of the analysts and designers work is done in these diagrams. When a relationship is added in a class diagram, it is added to the underlying class model.

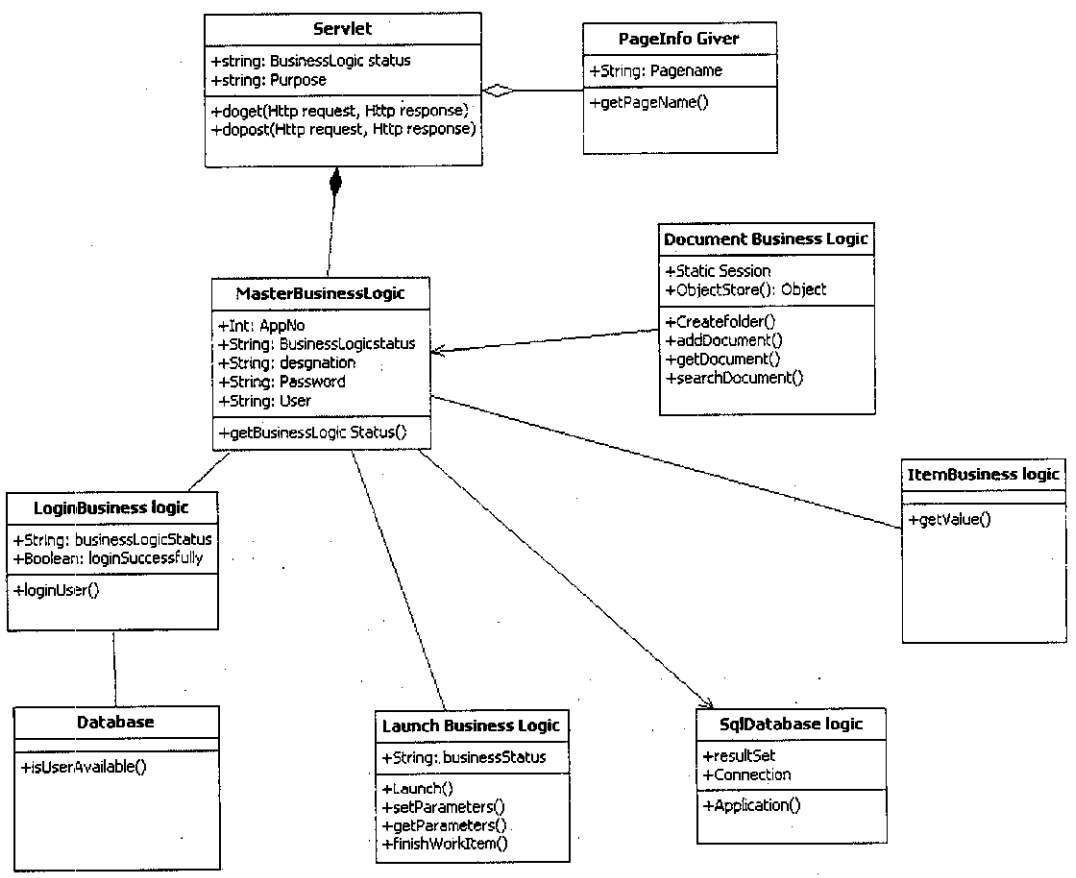


Figure 4.6.1 Class diagram

4.7 INPUT DESIGN AND OUTPUT DESIGN

4.7.1 Input Design

Input design is the process of converting the user-originated input to a computer –based format. The input to a system can be designed as the information that is to be provided to the system, which is used for further processing to obtain meaningful information that helps in decision making. Input screens are user friendly.

Inaccurate inputs are the most common cause for errors in data processing. Proper messages and appropriate directions can control errors committed by data entry operators. These features have been incorporated into the input design of this system

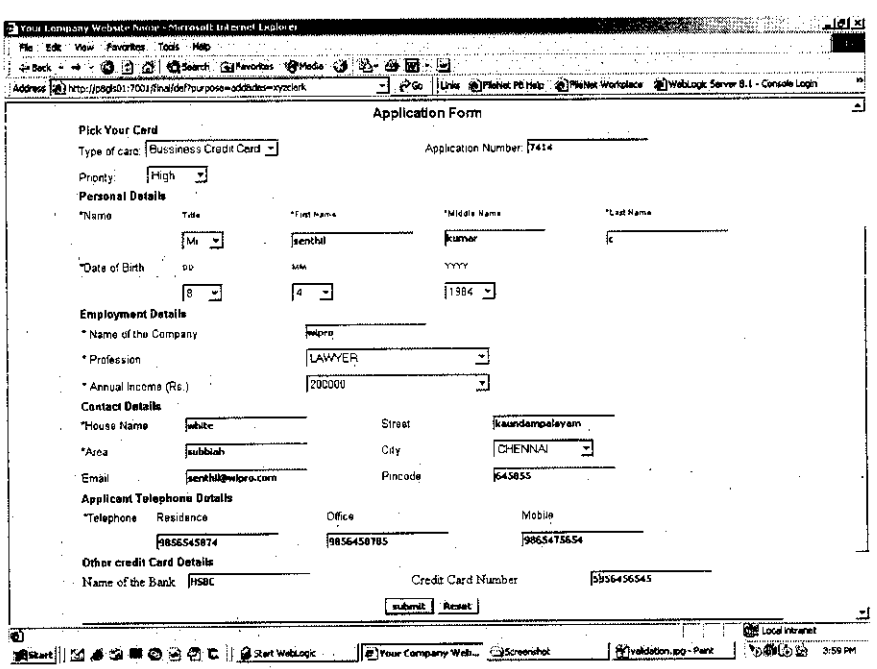


Figure 4.7.1 Input Form Layout Design

The time to complete a form is been minimized and the data being collected is mostly familiar to users (for instance, entering a name, address, and personal information in a check-out flow), a vertical alignment of labels and input fields is likely to work best. Each label and input field is grouped by vertical proximity and the consistent alignment of both input fields and labels reduces eye movement and processing time.

Appropriate messages are provided which promotes the user in entering the right data. Erroneous data inputs are checked at the end of each screen entry.

Visual Elements

The main advantages of a "left-justified horizontal label" layout is easy scanning of input labels and reduced vertical screen space, it may be tempting to attempt to rectify its primary shortcoming: the separation of input fields and their respective labels.

This approach features the addition of background colors and rules: the different background colors create a vertical unit of labels and a vertical unit of inputs; the horizontal rules form a relationship between each label and input field pair.

The aim is to point out related groupings of information to users, a thin horizontal rule or light background color can visually unite related data. Both of these elements (rules and background colors) are been especially useful for drawing attention to the primary call to action of a form.

Primary & Secondary Actions

The primary action associated with a form (most commonly "submit" and "Reset") needs to carry a stronger visual weight (in the example above bright color, bold font, background color, etc.) than the other form elements and should vertically align with the input fields. This illuminates a path for users and guides them to completion of the form.

The forms have multiple actions such as "Home" and "Inbox" it may be wise to reduce the visual weight of the secondary action. This minimizes the risk for potential errors and further directs users to completion.

4.7.1 Output Design

Computer output is the most important and direct source of information to the user. Efficient output design improves the system relationship with the user and in decision-making. The task output preparation is critical requiring skill and ability to align user requirements with capabilities of the system in operation.

The output design phase of the system design is concerned with the conveyance of information to the end-users in a user-friendly manner. The output design is efficient, intelligible so that systems relationship with the end-user is improved and thereby enhancing the process of decision making. The output design is an ongoing activity

almost from the beginning of the project, and follows the principle of form design. Efficient and well-defined output design improves the relation between system and users.

Output Form layout

The web application pages are designed in such a way that the user can accomplish the task with the maximum of three clicks.

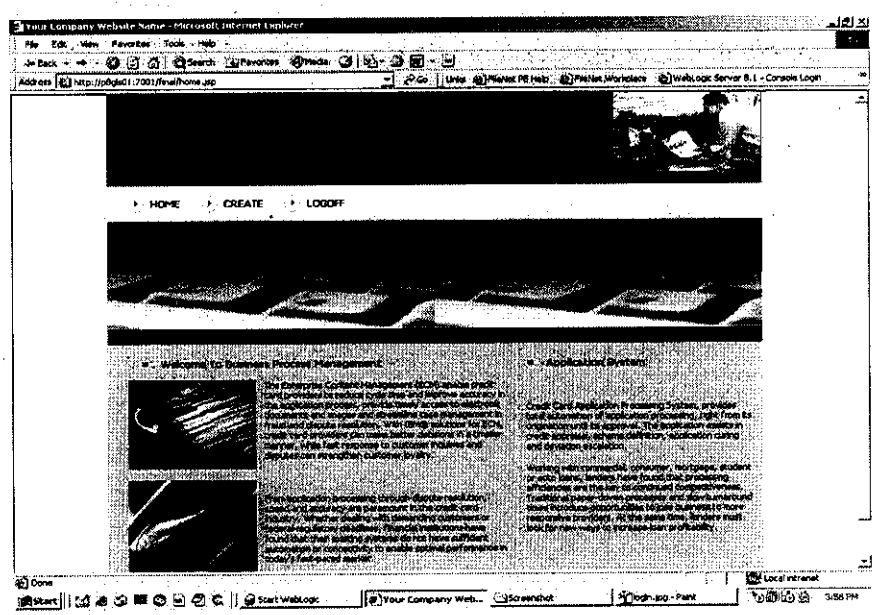


Figure 4.7.2 Home Page Layout Design

The pages are designed in a way for easy scanning of options which reduces vertical screen space and the entire content is visible without scrolling. Navigation from different pages to the Home page is been linked. The background images give a better look and feel for the users and the background content gives a good understanding about the application.

The time to view a form is been minimized and the data being viewed is mostly familiar to users (for instance, entering a name, address, and personal information in a check-out flow).

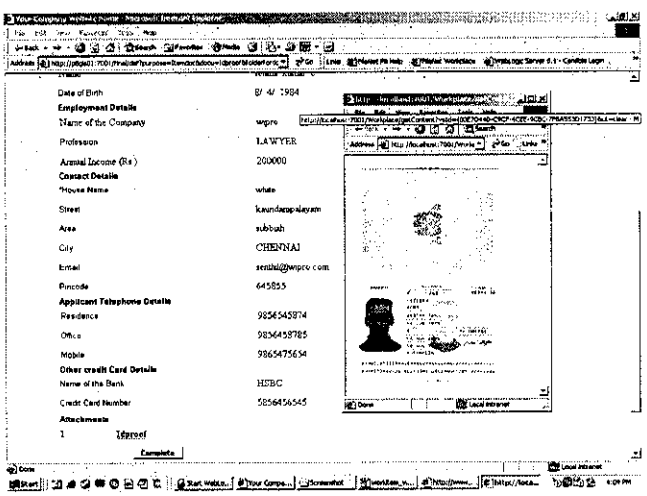


Figure 4.7.3 Document View Layout Design

A vertical alignment of labels and static output fields is likely to work best. Each label and output field is grouped by vertical proximity and the consistent alignment of both output fields and labels reduces eye movement and processing time.

The document list is been appended vertically to the form and the documents can be viewed in an individual pop-up window.

CHAPTER V

ARCHITECTURAL DETAILS

5.1 MVC ARCHITECTURE

MVC (Model View Controller)

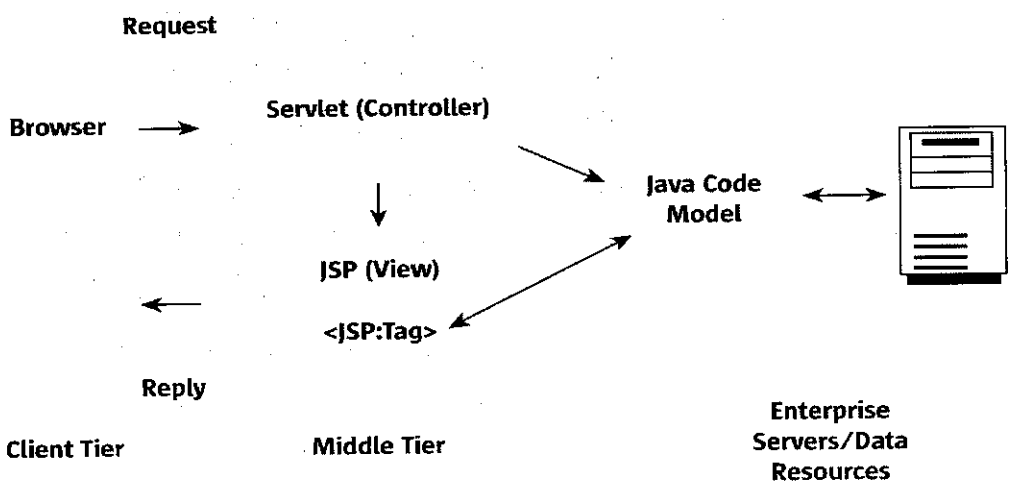


Figure 5.1.1 MVC Architecture

Model (Business process layer)

- Models the data and behavior behind the business process
- Responsible for actually doing
  - Performing DB queries
  - Calculating the business process
  - Processing orders
- Encapsulate of data and behavior which are independent of presentation.

View (Presentation layer)

- Display information according to client types
- Display result of business logic (Model)
- Not concerned with how the information was obtained.

Controller (Control layer)

- Serves as the logical connection between the user's interaction and the business services on the back
- Responsible for making decisions among multiple presentations
  - E.g. User's language, locale or access level dictates a different presentation.
- A request enters the application through the control layer; it will decide how the request should be handled and what information should be returned.

SERVLET-CENTRIC ARCHITECTURE.

This application system is designed in servlet centric architecture.

- JSP pages are used only for presentation
  - Control and application logic handled by a servlet (or set of servlets)

- Servlet serves as a gatekeeper
  - Provides common services, such as authentication, authorization, login, error handling, and etc

- Servlet serves as a central controller
  - Act as a state machine or an event dispatcher to decide upon the appropriate logic to handle the request
  - Performs redirecting

5.2 FILENET P8 ARCHITECTURE

The FileNet P8 platform offers enterprise-level scalability and flexibility to handle the most demanding content challenges, the most complex business processes, and integration to all your existing systems.

As you see in the below Figure, the FileNet P8 Platform provides the baseline components for enterprise content management solutions, including a content engine, a process engine, an application engine, and a rendition engine. These components address Enterprise Content Management (ECM) and Business Process Management (BPM) requirements.

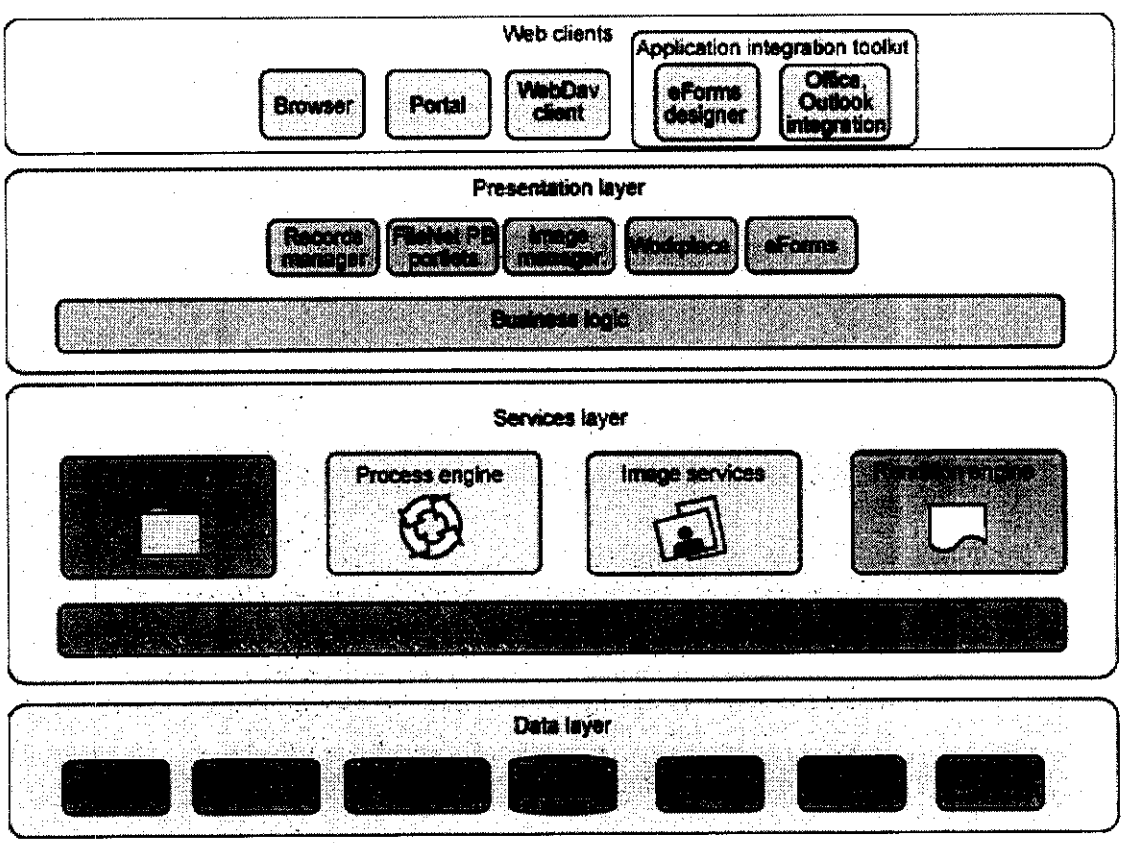


Figure 5.2.1 FileNet Architecture

The FileNet P8 family of products includes back-end services, development tools, and applications that address enterprise content and process management requirements.

FileNet P8 Platform provides the baseline components for enterprise content management solutions, including Content Engine, Process Engine, Application Engine, and Rendition Engine. These components address enterprise content management (ECM) and business process management (BPM) requirements. Additional components can be added to a system to enable additional capabilities.

FileNet P8 core has four core engines, they are

1) Content Engine
2) Process Engine
3) Application Engine
4) Rendition Engine

Content Engine

- Content Engine is designed to handle the heavy demands of a large enterprise content.
- It is capable of managing enterprise-wide workflow objects, custom objects, and documents by offering powerful and easy-to-use administration tools.
- Using these tools, an administrator can create and manage the classes, properties, storage, and metadata that form the foundation of an Enterprise Content Management system.

Process Engine

- Process Engine provides software services for managing all aspects of business processes (also called workflows), such as process execution, process routing, rules management, process simulation and modeling, and workflow analysis.
- Process Engine components allow you to create, modify, and manage workflows implemented by applications, enterprise users, or external users (such as partners and customers).

Application Engine

- Application Engine is the FileNet P8 Platform component that hosts the Workplace web application, Workplace java applets, and application development tools.
- It is the presentation layer for both process and content.
- Application Engine protects user credentials passed between Workplace and Content Engine and, if configured, provides SSL security.

Rendition Engine

- Rendition Engine converts documents from a variety of formats, such as those produced by Microsoft Office programs (Word, Excel, PowerPoint) to PDF and HTML formats.
- Multiple Rendition Engines can be configured to support large numbers of conversion requests.

CHAPTER VI

TESTING

Software testing is the process used to assess the quality of computer software. It is an empirical technical investigation conducted to provide stakeholders with information about the quality of the product or service under test, with respect to the context in which it is intended to operate. This includes, but is not limited to, the process of executing a program or application with the intent of finding software bugs. Software testing methods is been divided into black box testing and white box testing.

Black box testing treats the software as a black-box without any understanding of internal behavior. It aims to test the functionality according to the requirements. Thus, the tester inputs data and only sees the output from the test object.

White box testing, however, is when the tester has access to the internal data structures, code, and algorithms. White box testing methods include creating tests to satisfy some code coverage criteria.

Testing can be done on the following levels:

- Unit Testing
- Integration Testing
- System Testing

Unit Testing

Unit testing deals with a unit as a whole. This would test the interaction of many functions but confine the test within one unit. Unit testing tests the minimal software component, or module. Each unit (basic component) of the software is tested to verify that the detailed design for the unit has been correctly implemented.

Test Case Report

TC: 1

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass/ Fail	Comments
1	Register new customer	Details of the customer	The details are been stored in the Database.	Details are sent to the Validaors Inbox	**Pass**	
2	Add Documents	Image files and documents	Displays already inserted files and adds attachment	Inserted files get displayed in the form	**Pass**	
3	Search for a work item	Case Id, Type of card	Displays work items which satisfies the search	A list of cases matching the search will be displayed	**Pass**	

TC: 2

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass/ Fail	Comments
1	Displaying Inbox		Inbox listing the work Items to be displayed	Inbox listing the work items displayed	**Pass**	
2	Pending Inbox		The work items that are pending should be displayed	Pending work items are displayed	**Pass**	
3	Complete Work Item		The case should be successfully moved to corresponding verifiers Inbox	The case item is successfully completed	**Pass**	
4	Search for a work item	Case Id, Type of card.	Displays cases which satisfies the search	A list of cases matching the search will be displayed	**Pass**	

TC: 3

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass /Fail	Comment
1	Displaying Inbox		Inbox listing the work Items to be verified should be displayed	Inbox listing the work items should be displayed	**Pass**	
2	Pending Inbox		The work items that are pending should be displayed	Pending work items are displayed	**Pass**	
3	Complete Work Item	Responses such as investigate, accept, reject	The case should be successfully be moved to corresponding Inbox according to the response	The case item is successfully completed by moving to corresponding Inbox	**Pass**	
4	Search for a work item	Case Id, Type of card	Displays cases which satisfies the search	A list of cases matching the search will be displayed	**Pass**	

TC: 4

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass/ Fail	Comments
1	Displaying Inbox		Inbox listing the work Items to be investigated should be displayed	Inbox listing the work items should be displayed	**Pass**	
2	Pending Inbox		The work items that are pending should be displayed	Pending work items are displayed	**Pass**	
3	Complete Work Item		The case should be successfully be moved to corresponding verifiers Inbox according to the response	The case item is successfully moved to the verifier	**Pass**	
4	Search for a work item	Case Id, Type of deposit	Displays cases which satisfies the search	A list of cases matching the search will be displayed	**Pass**	

TC: 5

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass/ Fail	Comments
1	Displaying Inbox		Inbox listing the work Items to be approved/ reject should be displayed	Inbox listing the work items are displayed	**Pass**	
2	Complete Work Item	Responses-reject	The case should be successfully closed	The case is closed	**Pass**	
3	Complete Work Item	Responses-Accept	The case should be completed successfully.	A new card is dispatched	**Pass**	
4	Search for a work item	Case Id, Type of card	Displays cases which satisfies the search	A list of cases will be displayed	**Pass**	

Integration Testing

Integration testing is the phase of software testing in which individual software modules are combined and tested as a group. It follows unit testing and precedes system testing. Integration testing takes as its input modules that have been unit tested, groups them in larger aggregates, applies tests defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing.

Clerk and validator

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass /Fail	Comments
1	Allocating a new work item in the validators Inbox	Complete the work item.	Work item routed to correspondin g verifier	Work item present in validators Inbox	Pass	

Validator and Verifier

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass /Fail	Comments
1	Forward a particular work item in the verifiers Inbox	Verify or accept	Work item routed to corresponding verifier	Work item present in verifiers Inbox	Pass	

Verifier and manager

S.No	Test Case	Input Data	Expected Result	Actual Result	Pass /Fail	Comments
1	Forward a particular work item for approval/ reject to managers Inbox	Accept or reject	Work item routed to corresponding manager	Work item present in managers inbox	Pass	

System Testing

System testing of software or hardware is testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. System testing falls within the scope of black box testing, and as such, should require no knowledge of the inner design of the code or logic.

As a rule, system testing takes, as its input, all of the "integrated" software components that have successfully passed integration testing and also the software system itself integrated with any applicable hardware system. The purpose of integration testing is to detect any inconsistencies between the software units that are integrated together (called *assemblages*) or between any of the *assemblages* and the hardware. System testing is a more limiting type of testing; it seeks to detect defects both within the "inter-assemblages" and also within the system as a whole.

System Validation

Input validation is a challenging issue and the primary burden of a solution falls on application developers. However, proper input validation is one of your strongest measures of defense against today's application attacks. Proper input validation is an effective countermeasure that can help prevent buffer overflows, and other input attacks.

Input validation is challenging because there is not a single answer for what constitutes valid input across applications or even within applications.

Input validation starts with a fundamental supposition that all input is malicious until proven otherwise. Whether input comes from a service, a file share, a user, or a database, validate your input if the source is outside your trust boundary.

The following practices are implemented in this Web application's input validation:

- Assume all input is malicious.
- Centralize approach.
- Aware of canonicalization issues.
- Constrain, reject, and sanitize the input.

Input validation strategy a core element of your application design. Consider a centralized approach to validation, for example, by using common validation and filtering code in shared libraries. This ensures that validation rules are applied consistently. It also reduces development effort and helps with future maintenance.

In many cases, individual fields require specific validation, for example, with specifically developed regular expressions. However, you can frequently factor out common routines to validate regularly used fields such as e-mail addresses, titles, names and postal addresses including ZIP or postal codes, and so on.

CHAPTER VII

PERFORMANCE AND LIMITATIONS

7.1 MERITS OF THE SYSTEM

This Web Application system is an Enterprise Content Management (ECM) helps the world's leading banks and other private credit agencies streamline and automate their business processes, access and manage all forms of content and automate records management to help meet compliance needs. Everything you need to make quick, smart and cost-effective decisions. Right at the moment it matters the most.

This enterprise content management solution provides a flexible and scalable framework for:

- Managing content
- Automating, streamlining and analyzing business processes
- Improving collaboration
- Helping ensure compliance
- Simplifying decision-making across business divisions or around the world

The System would control the information in a secure, highly scalable, collaborative environment that satisfies the most stringent compliance requirements.

Processes involve people, business systems and content. This Application system with all the three components works together in an automated environment that maximizes business performance and increases competitive advantage.

7.2 LIMITATIONS OF THE SYSTEM

Even though application system automates the business processes, access and manage all forms of content there are some limitation.

- The workflow design should be changed according to the business requirements.
- A single work item can handle content up to 1 GB in the FileNet repositories.
- Any changes to the images, documents, custom object should be annotated.

7.3 FUTURE ENHANCEMENTS

This application system can be integrated with EMC Captiva Input*Accel*.

EMC Captiva Input*Accel* enables us to capture information from most paper or electronic sources, transform it into digital content, and deliver it into back-end systems. By helping your business reduce or completely eliminate manual data entry, Input*Accel* minimizes processing errors, improves data accuracy, and boosts productivity.

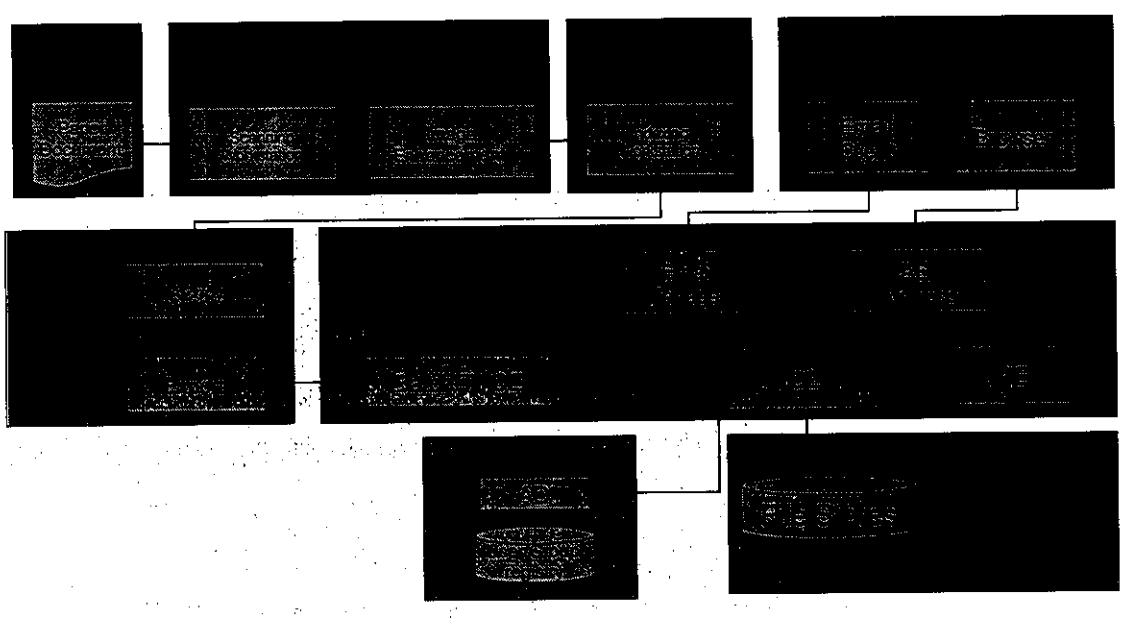


Figure 7.3.1 Captiva Input*Accel*

With Input*Accel*, you also prepare your business for future growth with server configurations that scale to large enterprise installations with multiple servers. These high-availability configurations ensure that if one of your servers goes offline, others will continue to operate, protecting your work in progress and eliminating downtime.

The additional functionalities and modification can be done to this system in future, since the system follows a MVC pattern. The system can be easily changed depending upon the organizational policy and needs.

BPF integration with FileNet P8 – Business Process Framework

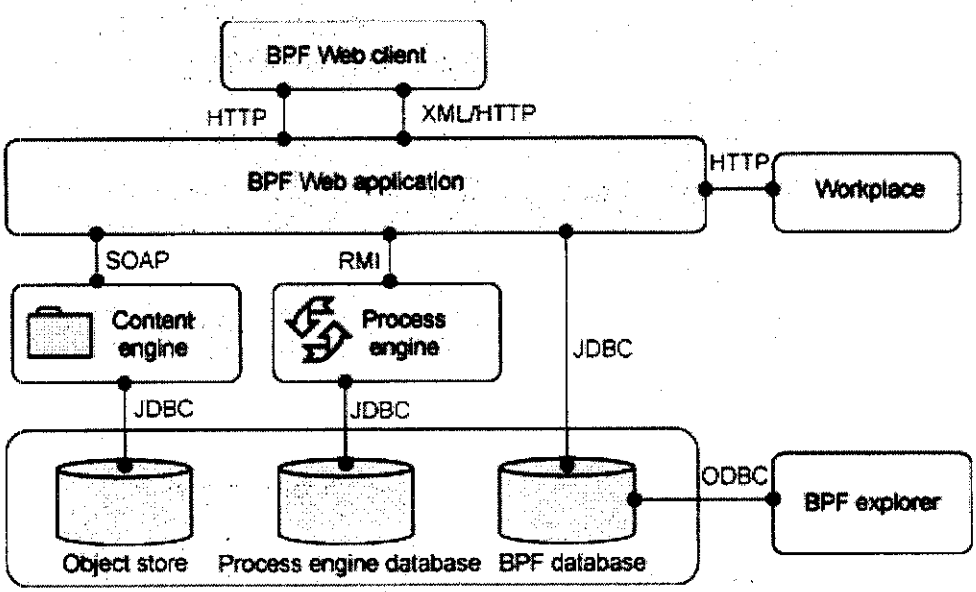


Figure 7.3.2 Business process Framework

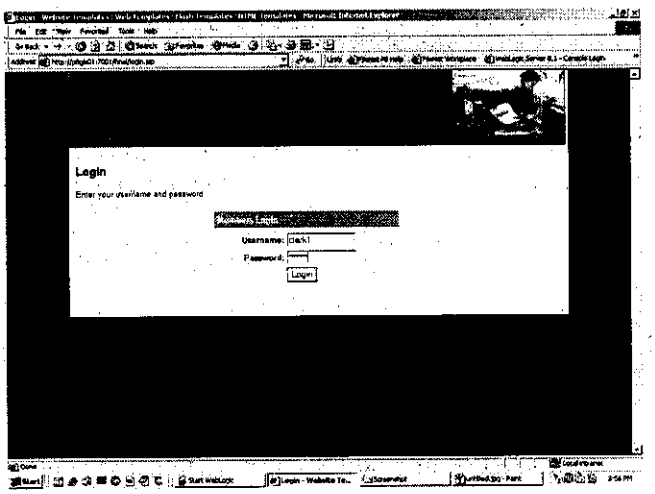
BPF not only provides a solution that integrates content storage and process management, but also has an extensive framework that companies can use to develop and customize their own applications to meet their business requirements.

FileNet BPF has a configurable framework that facilitates rapid development of BPM applications, enabling efficiency and speeding the development and deployment of BPM applications.

CHAPTER VIII

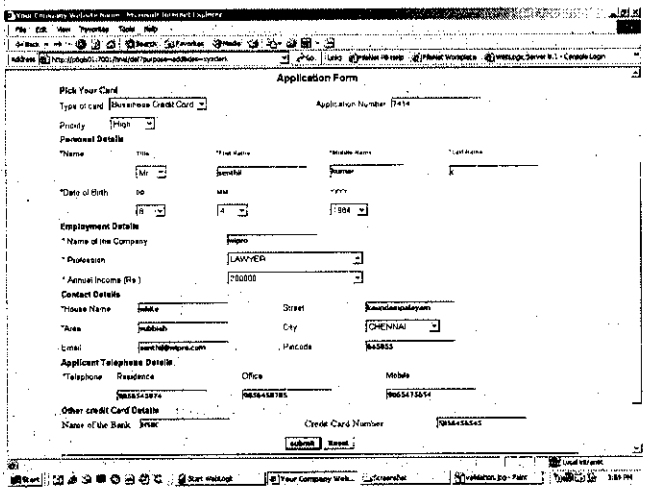
APPENDICES

8.1 SAMPLE SCREENS

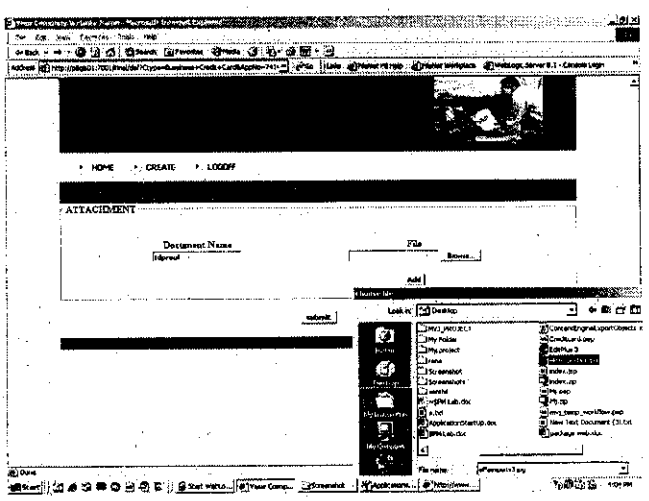


A1.1 Login Page

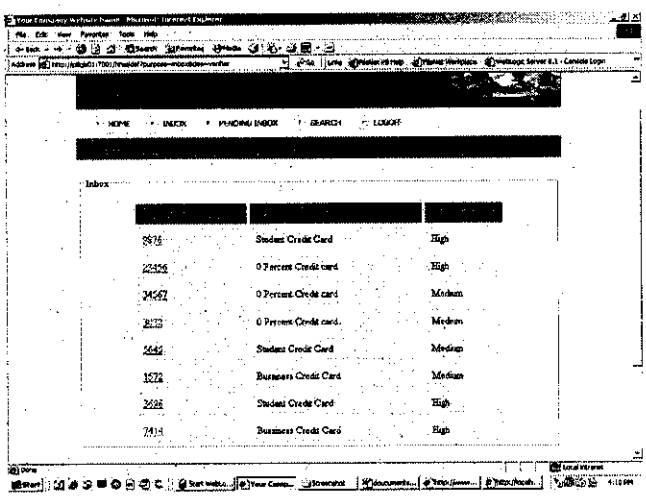
A1.2 Home Page



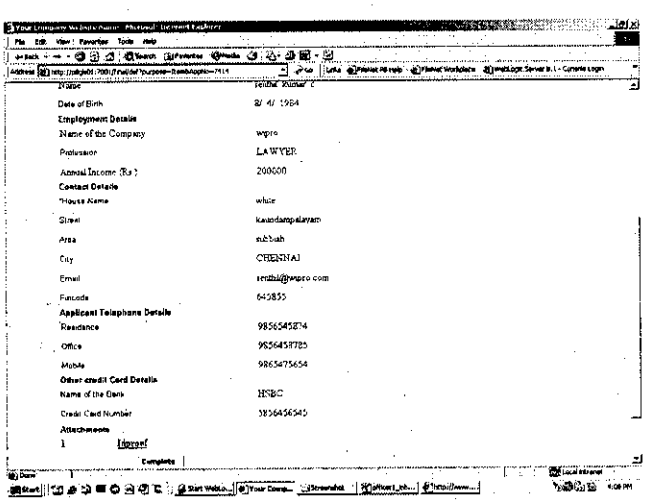
A1.3 Application Form



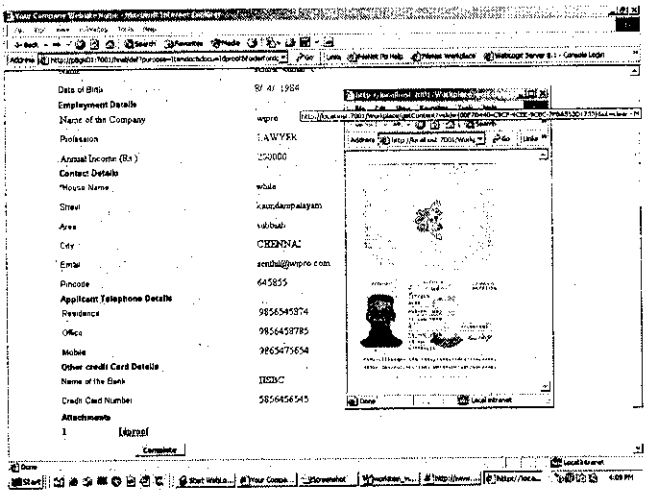
A1.4 Adding Attachments



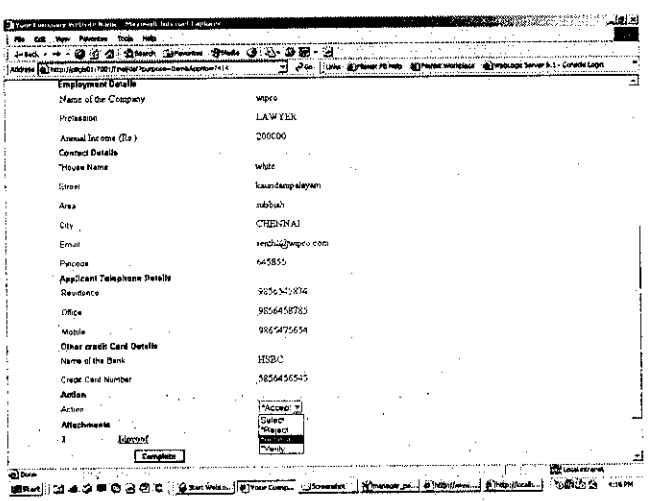
A1.5 Inbox



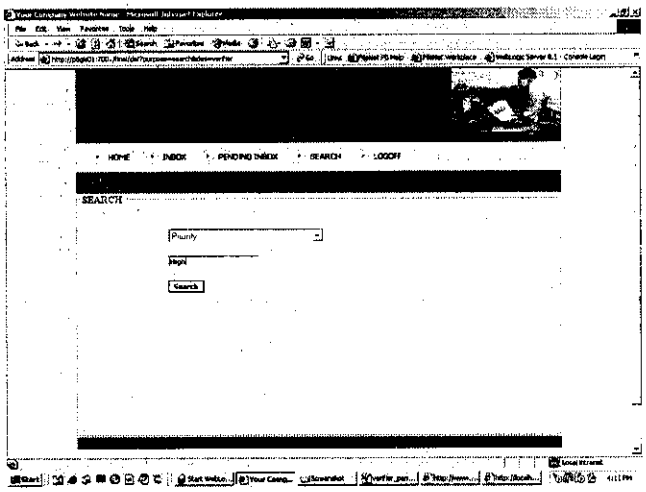
A1.6 View Work item



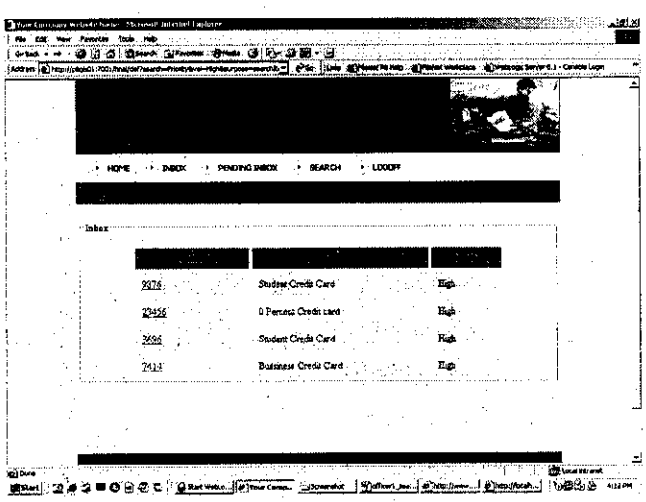
A1.6 View attachments (documents)



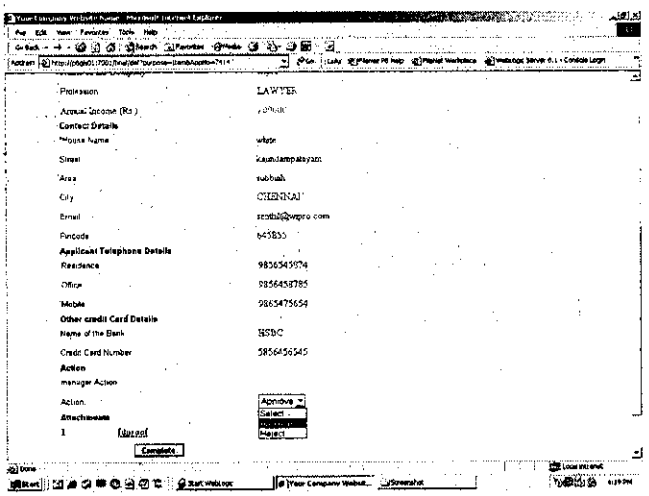
A1.7 Routing the work item



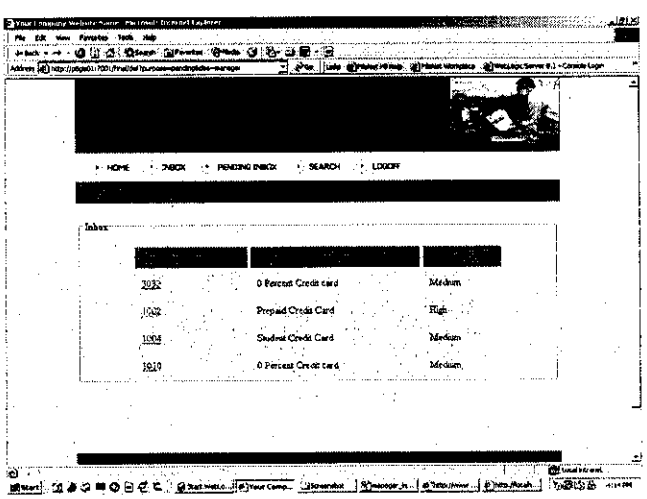
A1.8 Searching



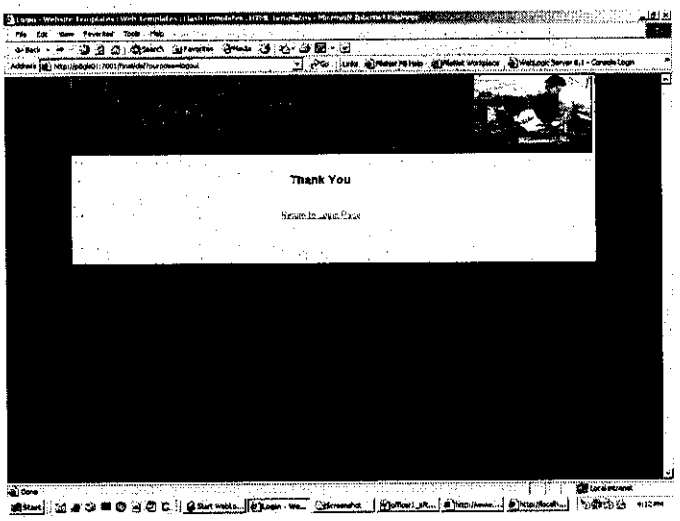
A1.9 Searched work items



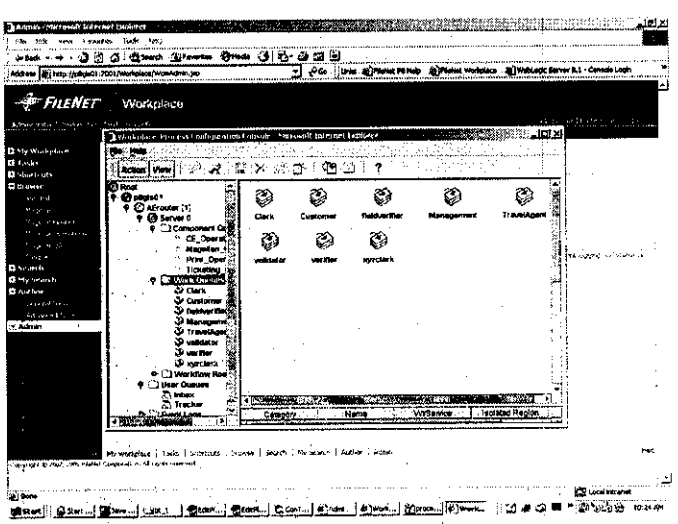
A1.10 Managers Approval



A1.11 Managers Pending Inbox



A1.12 Log off



A1.13 FileNet Workplace

CHAPTER IX

REFERENCES

1. Hwebert Schidt, "The Complete Reference Java 2" Fifth Edition, Tata McGraw Hill Publication
2. Phil Hanna, "JSP (Java Servlet Page)-The Complete Reference", Tata McGraw Hill Edition, 2001.
3. https://www.extra.filenet.com/
4. www.wikipedia.com
5. www.wikibooks.com
6. http://filenet.intellinex.com/filelms/lang-en/SYS_Login.asp