

ENTERPRISE CONTENT MANAGEMENT

A PROJECT REPORT

Submitted by

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to

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

MASTER OF COMPUTER APPLICATION



**Thangal Kunju Musaliar College of Engineering
Kerala**

DEPARTMENT OF COMPUTER APPLICATION

MAY 2023

DECLARATION

I undersigned hereby declare that the project report on **ENTERPRISE CONTENT MANAGEMENT** , submitted for partial fulfillment of the requirements for the award of degree of Master of Computer Application of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by me under supervision of **Dr.Nadera Beevi S.** This submission represents my ideas in my own words and where ideas or words of others have been included,I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University..

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CERTIFICATE

This is to certify that the report entitled **ENTERPRISE CONTENT MANAGEMENT** submitted by **RAICHAL VARGHESE** (TKM21MCA-2031) to the APJ Abdul Kalam Technological University in partial fulfillment of the Masters degree in Computer Application is a bonafide record of the project work carried out by her under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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Project Title: Enterprise Content Management on Cloud

Project Details: This is intended to acquire skills on document management & workflow automation of business processes with the help of ECMoC V1 solutions like IBM FileNet, CMOD, Datacap and Ansible.

Internship Serial Number: A000A4744

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A handwritten signature in black ink, appearing to read 'S. Singh'.

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ABSTRACT

ENTERPRISE CONTENT MANAGEMENT (ECM) solutions enable an organization to take full advantage of the customer information and knowledge embedded in its content. ECM solutions capture, store, activate, analyze and automate business content, providing new value from data. When effectively managed across the organization, content can be used to engage customers and automate business processes.

It enhances the automation of manual, repetitive tasks so that employees can focus on critical risks. This is to create an automated business process (Loan Application) with efficient use of ECM tools that avoid repeatable, multistep business transactions.

This system aims to reduce human interventions within the process by making most of the work items automated. Design business workflow of Loan Application process and to store the documents related to Loan of users using ECM. Design and develop a system that immediately trigger the workflow when an application is submitted.

This system uses IBM FileNet Platform for content management (ACCE, ICE) along with Process designer for designing workflows. Each step within a business process is considered as a work items. One work item is allotted to a single user or a group of users. With the efficient use of ECM, many work items can automated within the system itself. Workflow routes are configured such that it requires minimum human intervention. This system manages content and turns information into a vital business asset and helps to control documents.

Also, this aims at minimizing the cost of executing various steps in a business process by automation. It combines enterprise content management, comprehensive business process management, and extensive compliance capabilities to address a wide range of content-related business requirements.

Contents

List of Figures	iii
1 Introduction	1
1.1 Company Profile	2
1.1.1 Products	3
1.1.2 Services	5
1.2 Existing System	6
1.3 Proposed System	6
1.4 Objective	7
2 Literature Survey	8
2.1 Purpose of the Literature Review	8
2.2 Related Works	9
2.2.1 ECM	9
2.2.2 Digitalization	10
2.2.3 Automated Business Process	10
2.2.4 Cloud-based ECM	11
2.2.5 Performance Engineering	11
2.2.6 Business process modeling	12
2.2.7 Devops	12
2.2.8 Robotic process automation	13
2.2.9 Ansible for automation	13
2.2.10 Security and Compliance	14
3 Methodology	15
3.1 Module Description	16

ENTERPRISE CONTENT MANAGEMENT

3.1.1	Content Management	16
3.1.2	Process Management	17
3.2	Business Process Automation	18
3.2.1	Working	18
3.2.2	Steps Involved	20
3.2.3	Automate using Ansible	21
3.3	System Specifications	22
3.3.1	Software Specification	22
3.3.2	Software Description	22
3.4	System Design	28
3.4.1	Architectural Design	28
3.5	User Interface Design	29
4	RESULT AND DISCUSSION	30
4.1	Testing and it's types used	30
4.1.1	Functional testing	31
4.1.2	Regression Testing	31
4.1.3	Security Testing	31
4.1.4	Integration Testing	32
4.2	Test cases in IBM FileNet Content Management	32
4.3	Output Screens and Results	34
5	CONCLUSION	39
5.1	Future Enhancement	39
	REFERENCES	40
	APPENDIX	42

List of Figures

3.1	High-level architectural Diagram of ECM System	16
3.2	Module 1 flow chart	17
3.3	Module 2 flow chart	18
3.4	Business Process Automation working Diagram	19
3.5	Architectural Design of DataCap - Data Capture,Recognition,ValidationVerification	28
4.1	ACCE Console: IBM FileNet P8	34
4.2	ICN : IBM FileNet P8	35
4.3	IBM Datacap Console	36
4.4	IBM CMOD Ondemand Administrative Client Console	37
4.5	IBM Websphere Application Server Console	38
A.1	Administrative Console	42
A.2	Web based Client Console	43
A.3	Application Server Interface - Websphere	43
A.4	Content Mangement Files	44
A.5	Permission Granting in CMOD	45
A.6	CMOD Administrator Interface	45
A.7	Workflow Design of a Loan Application in Process Designer	46
A.8	Process Administrator for a workflow	46
A.9	Roles and Work Queue in Process Designer	47
A.10	Datacap Server Manager Console	47
A.11	Datacap RuleRunner	48
A.12	Logging in Datacap	48

Chapter 1

Introduction

ENTERPRISE CONTENT MANAGEMENT (ECM) systems are designed to help businesses manage their information more efficiently and effectively, while ensuring compliance with regulatory requirements and minimizing risk. ECM solutions capture, store, activate, analyse and automate business content, providing new value from data. When effectively managed across the organization, content can be used to engage customers and automate business processes. It enhances the automation of manual, repetitive tasks so that employees can focus on critical risks. It also manage content more securely, consistently and intelligently from all repositories and file shares from a single, comprehensive and scalable solution.

ECM systems typically include document management, records management, digital asset management, workflow management, and web content management capabilities. They are often used in large organizations where there are multiple departments, teams, and individuals involved in creating and managing content.

The benefits of ECM include increased productivity, improved collaboration and communication, better control over information and data, reduced risk and compliance issues, and improved customer service. However, implementing an ECM system can be complex and costly, and requires careful planning and a comprehensive understanding of the organization's needs and requirements. IBM ECM is a suite of software products that provide organizations with a comprehensive platform for managing their information and content. IBM ECM solutions are designed to help organizations improve productivity, reduce costs, and manage risk and compliance. They are used in a variety of industries, including healthcare, financial services, government, and manufacturing. IBM also offers a range of services to help organizations implement, configure, and optimize their ECM solutions.

Business Process Automation (BPA) is used by companies to automate and streamline their business processes. BPA can help businesses to reduce errors, cut down processing time, increase productivity, and improve customer satisfaction. By automating repetitive and manual tasks, companies can focus on more strategic and value-added activities.

ECM and BPA are often used together to create an end-to-end solution for managing content and automating business processes. By integrating ECM and BPA, companies can create a seamless workflow that starts with content creation, goes through review and approval processes, and ends with automated document routing, distribution, and archiving. This can help businesses to reduce manual labor and speed up processes, leading to improved efficiency and better customer experiences. Automation can help content management in organizations by streamlining document processing, enhancing compliance, and improving collaboration. Automated workflows can speed up document processing, ensure compliance with established regulations, and provide a centralized repository for documents that enables access and version control. Automation can also provide insights into content management processes through data analytics, helping organizations to identify areas for improvement and make data-driven decisions..

Another advantage of using ECM and BPA is the ability to access real-time data and analytics. By capturing and analyzing data from business processes, companies can gain valuable insights into their operations, identify areas for improvement, and make informed decisions to optimize their workflows. This can help companies to stay competitive and agile in an ever-changing business environment.

In summary, companies use ECM and BPA to improve their business operations, streamline processes, reduce costs, increase productivity, improve customer satisfaction, and gain valuable insights into their operations. By leveraging these technologies, companies can create a competitive advantage and stay ahead in today's dynamic and fast-paced business landscape.

1.1 Company Profile

IBM ECM solutions provide a centralized platform for managing enterprise content, which leads to improved productivity, enhanced collaboration, better decision-making, reduced costs, and compliance with regulatory requirements. IBM ECM also provides a flexible and scalable platform that enables organizations to respond quickly to changing business needs and

requirements.

1.1.1 Products

- **IBM FileNet Content Manager**

IBM FileNet Content Manager is a powerful and scalable content management system that enables organizations to manage their documents and content across the enterprise. It offers advanced workflow capabilities, automated records management, and seamless integration with other IBM ECM solutions.

- **IBM Content Manager**

IBM Content Manager is a content management system developed by IBM that allows users to store, manage, and access digital content in various formats across an organization. It provides features such as document imaging, workflow management, and integration with other enterprise systems. Features of IBM Content Manager :

1. Centralized content management: IBM Content Manager provides a centralized location for storing and managing content, making it easier to organize, search for, and access information across an organization.
2. Improved workflow and collaboration: With IBM Content Manager's workflow management capabilities, users can collaborate more effectively on content creation, review, and approval processes, reducing errors and delays.
3. Enhanced security and compliance: IBM Content Manager offers a range of security and compliance features, including access controls, audit trails, and records management, to help organizations meet regulatory requirements and protect sensitive information.
4. Integration with other enterprise systems: IBM Content Manager can be integrated with other enterprise systems, such as CRM and ERP applications, to provide a more comprehensive view of organizational data and streamline business processes.
5. Customization and scalability: IBM Content Manager is highly customizable and can be tailored to meet the specific needs of different organizations. It also offers scalability to accommodate growing amounts of content and users.

- **IBM Case Manager**

IBM Case Manager is a solution developed by IBM that helps organizations manage case-based business processes. It provides a unified platform for organizing and automating tasks, documents, and data related to a specific case, improving collaboration and decision-making. With IBM Case Manager, organizations can increase efficiency, reduce errors, and improve customer service in various industries, such as healthcare, government, and financial services. Here are some key features of IBM Case Manager:

1. Case creation and management: IBM Case Manager enables users to create and manage cases by organizing relevant information, documents, and tasks into a single location, making it easier to track progress and identify issues.
2. Advanced search and analytics: IBM Case Manager includes advanced search and analytics features that allow users to quickly and easily find relevant information and analyze data to gain insights into case-related issues.

- **IBM Datacap**

IBM Datacap is a data capture and document processing solution developed by IBM. It uses advanced technologies such as optical character recognition (OCR), intelligent character recognition (ICR), and natural language processing (NLP) to capture and extract data from various sources, including paper documents, emails, and digital files. With IBM Datacap, organizations can automate data capture processes, reduce errors, and increase efficiency in industries such as healthcare, financial services, and government.

Some of the key features of IBM Datacap include automated document classification, data extraction, and validation, as well as integration with other enterprise systems such as content management and workflow solutions. It also provides analytics and reporting capabilities to help organizations gain insights into their data capture processes and identify opportunities for improvement. The key features of IBM Datacap are::

1. Automated document classification: IBM Datacap uses artificial intelligence and machine learning algorithms to automatically classify documents based on their content and structure, reducing the need for manual sorting and routing.
2. Intelligent data extraction: IBM Datacap can extract data from structured and

unstructured documents using a combination of OCR, ICR, and NLP technologies, improving accuracy and efficiency.

3. Data validation and verification: IBM Datacap includes validation and verification features that help ensure the accuracy of extracted data by comparing it against pre-defined rules and business logic.
4. Integration with other systems: IBM Datacap can be integrated with other enterprise systems, such as content management and workflow solutions, to streamline business processes and improve collaboration.
5. Analytics and reporting: IBM Datacap provides analytics and reporting capabilities that enable organizations to gain insights into their data capture processes and identify opportunities for improvement.

1.1.2 Services

- **Content creation and capture:**

We provide tools and technologies to capture and create content, including document imaging, scanning, and electronic forms.

- **Records management and retention**

We provide tools and features to manage records effectively, including retention schedules, legal holds, and disposition workflows. We are a specialised consulting organisation that provides Big Data Services.

- **Content management and collaboration**

We enable organizations to manage content effectively by providing features such as version control, document check-in and check-out, and collaboration tools.

- **Security and compliance**

We provide robust security and compliance features, including access controls, audit trails, and encryption, to help organizations protect sensitive information and meet regulatory requirements.

1.2 Existing System

Organizations which don't use ECMs face several challenges. They may struggle with document management, version control, and security issues when dealing with large volumes of documents and content. Without a centralized system for content management, employees may have difficulty finding the information they need to do their jobs effectively, which can lead to reduced productivity and wasted time. Additionally, organizations may face compliance and regulatory risks if they do not have a system in place to manage and track their content. Similarly, if organizations do not use BPM, they may face challenges related to process efficiency, quality control, and regulatory compliance. Manual processes can be time-consuming, error-prone, and difficult to track, making it hard to identify bottlenecks and opportunities for improvement. BPM can help automate and streamline processes, making them faster, more consistent, and more reliable. By automating processes, organizations can also reduce the risk of errors and ensure compliance with regulatory requirements. Overall, the traditional existing systems without the use of ECMs and BPMs can lead to inefficiencies, lost productivity, and increased risks, which can negatively impact an organization's bottom line and its ability to compete in the market.

1.3 Proposed System

A proposed system for organizations that have ECMs and BPMs could be an integrated platform that combines the features of both systems. The proposed system would provide a unified approach to content management and business process automation, allowing organizations to manage their content and automate their workflows in a seamless manner.

The integrated system would allow organizations to easily manage and organize their content from a centralized platform, providing tools for version control, search, and collaboration. At the same time, the system would provide automation tools for designing, executing, and monitoring business processes. The system would allow organizations to streamline their workflows, reduce manual labor, and improve the overall efficiency of their operations.

The proposed system would also provide analytics and reporting tools to help organizations monitor and optimize their workflows. The system would provide insights into process performance, identify bottlenecks, and suggest areas for improvement. Additionally, the system would be scalable and flexible, allowing organizations to customize and adapt it to their specific

needs and requirements.

To implement the proposed system, organizations would need to evaluate their current ECM and BPM solutions and determine the best approach for integrating them. This may involve selecting a vendor that offers an integrated solution, or working with a system integrator to develop a custom solution. The implementation process would need to be carefully planned and executed to ensure a smooth transition and minimize disruption to ongoing operations. This would provide organizations with a comprehensive solution for managing content and automating business processes, leading to increased efficiency, reduced costs, and improved customer experiences.

1.4 Objective

The goal is to accomplish the following:

- To store the documents related to business processes of users using ECM solutions.
- To execute automated scanning, verification, searching, archiving and retrieval of documents.
- To design a business workflow of a Loan Application process
- To design customized interfaces for different users and groups who participate in the workflow.
- To develop a system that immediately trigger the workflow when an application is submitted.

Chapter 2

Literature Survey

Literature review is that the comprehensive study and interpretation of literature that relates to a selected topic. When doing a literature review, research questions are defined, and then relevant literature is sought for and analysed to address these issues. By reanalyzing the study's data, it is possible to acquire fresh insights, which is an advantage of literature reviews. A literature review is both a summary and an explanation of the complete and current state of information on a topic as contained in academic books and journal articles. There are two types of literature reviews you may be required to write in college: one is written as a stand-alone assignment in a course, while the other is done as an introduction to or preparation for a longer piece of writing, typically a thesis or research report. The primary objective and perspective of your review, as well as the hypothesis or thesis argument you develop, depend on the type of review you are writing. You can learn the distinctions between these two types by reading published literature reviews or the introductory chapters of theses and dissertations in your subject area. Note the framework of their arguments and the manner in which they approach the issues.

2.1 Purpose of the Literature Review

1. It chooses top-notch research papers or studies that are pertinent, significant, important, and valid and summarises them into a single comprehensive report to provide readers with quick access to information on a certain issue.
2. By requiring them to describe, assess, and compare original research in this particular field, it gives researchers who are starting their research in a new area a great place to start.

3. It makes sure that researchers don't repeat already completed studies.
4. It can indicate potential directions for future research or suggest topics to concentrate on.
5. It emphasises the important findings.
6. It points up gaps, discrepancies, and inconsistencies in the literature.
7. It offers a helpful critique of the methods and strategies used by other researchers.

2.2 Related Works

2.2.1 ECM

ECMs provide a comprehensive, organization-wide solution for creating and storing information assets along with the structure and style information needed to publish information in the various formats an organization may require. ECMSs became an important issue for large companies in the early 2000s and more because of broader shifts to what called the "service economy," a model wherein large corporations need to build robust relationships with customers in order to succeed. In this model, information products play a key role, and one much more important than the ancillary role that user manuals or help genres played previously. Key knowledge and skills needed to work with ECMSs in the support economy included a more nuanced understanding of an organization's need to produce information and its organizational mission and/or business goals. In short, content creation and distribution for organizations with an enterprise-level commitment to content management moves closer to the bottom line, often including the ways they create products and services for their customers, clients, or members. The most recent shift in practice is to content strategy. Content strategy is a repeatable system defining the entire editorial content development process for a website . It became an important issue in the late 1990s to the early 2000s because as website development teams continued to grow (along with the increased volume of web content and web users), organizations needed a way to organize and maintain their content. Key knowledge and skills needed to address content strategy involve more than writing content and maintaining web links to it.[1]

2.2.2 Digitalization

The records, which are created as a part of the business process management and that are used as enterprise information sources, as well as the systems designed for their organization have recently experienced a swift evolution. This evolution has led to the transition from printed into electronic environment, yet more importantly to the emergence of new approaches and the convergence of different information systems. These conditions necessitate addressing the content firstly in the scope of document/records management, management of administrative and financial information systems and web content management in different environments ranging from structured information that is readable by electronic systems to image-based or printed information, within the framework of ECM applications. One of the main reasons for the above mentioned conditions is digitalization. Along with the swiftly increasing amount of the content, that is already born digital the digitalization is listed among the priorities on the agenda of many enterprises.[2]

2.2.3 Automated Business Process

Automated loan application is a process that enables borrowers to apply for a loan online, and it typically involves the following steps: Online application form: The borrower fills out an online application form that captures their personal and financial information, such as name, address, income, and the loan amount. Verification of information: The system verifies the information provided by the borrower through various means such as credit checks, income verification, and employment verification. The system may also access third-party databases to verify the information. Loan evaluation: The system evaluates the borrower's credit worthiness based on the information provided and the verification results. It also determines the loan amount, interest rate, and repayment terms based on the borrower's credit score, income, and other factors. Loan approval or rejection: The system either approves or rejects the loan application based on the evaluation results. If approved, the system generates a loan agreement that outlines the loan terms and conditions. E-signature and submission: The borrower signs the loan agreement electronically, either through an e-signature or a digital signature, and submits it back to the system.[3]

2.2.4 Cloud-based ECM

Cloud-based infrastructure aims to provide business users with greater visibility into process and business performance. To take advantage of many benefits, organizations can consider moving their ECM systems to the cloud or selecting a cloud-based ECM solution that meets their specific needs and requirements. Organizations should carefully evaluate potential cloud providers, considering factors such as security, reliability, scalability, and cost-effectiveness, before making a decision. It will let them monitor business process executions from operational systems that can collect, unify, and store execution data outcomes in an appropriate structure for later measurement and analysis. By analyzing event data, users can better understand business performance and improve their processes to achieve greater organizational effectiveness. Furthermore, such data helps analysts not only understand what happened in the past but also evaluate what's currently happening and predict the behavior of future process instances. However, effectively managing business information is challenging and not easily achieved using traditional approaches. Event data integration is essential for analytic applications, but it's difficult to achieve in highly distributed environments, where business processes are part of complex supply chains that are normally executed under a variety of heterogeneous systems.[4]

2.2.5 Performance Engineering

Performance engineering: For any software, performance engineering is a complex activity. It requires adequate knowledge to understand the software life cycle. In DevOps there is a low adoption of performance engineering. The reason behind low adoption is that the performance engineering approaches are not designed for DevOps context. There are many existing tools that are used for DevOps settings in organizations, for example Docker and Puppet but they do not align smoothly with the performance engineering process. Because of that many professionals still depend on SSH and system tools while working for software deployment and performance monitoring. Many professionals avoid using specialized tools such as APM (Application performance monitoring) tools. Performance engineering approaches should be lightweight.[5]

2.2.6 Business process modeling

BPMN, or Business Process Model and Notation, is a standard notation for modeling business processes. IBM supports BPMN through its Business Process Manager (BPM) software, which is a comprehensive platform for designing, executing, and managing business processes. IBM BPM provides a visual editor for creating BPMN diagrams that depict the flow of activities, decisions, and events that make up a business process. The software also includes tools for monitoring and analyzing process performance, as well as for automating tasks and integrating with other enterprise systems. Business process modeling tools that support simulation are a powerful means of improving business processes. With a view to avoid the risk of failure and unnecessary costs, current state process models are developed as an alternative to conducting real-world business process modification. Further attempts are made at improving those models. The aim of this paper is to show some of the model simulation and analysis capabilities of the IBM WebSphere Business Modeler. IBM is one of the leading tool vendors in this area and its market share is constantly rising. Case analysis is made on the example of Processing a loan application in one of largest Croatian banks. There are recognized and systematized simulation capabilities of the tool, which supports the Business Process Modeling Notation (BPMN).[6]

2.2.7 Devops

Software industry is always looking for effective and flexible ways to develop quality software within limited time and cost. Recently, DevOps paradigm has gained popularity in software development process. DevOps provides platform for both development and operation teams to work collaboratively to develop software products. DevOps facilitates cross functional shared responsibilities and trust between both types of development and operation teams. DevOps substantially extends the continuous development goals of the agile movement by supporting automation of continuous integration and release processes. DevOps is defined as: a culture effort that automate organization infrastructure and the processing cycle of software development, guaranteeing the software product. DevOps offer several benefits to software organizations such as more focus on implementation and frequent release. Moreover, DevOps also automate the build, testing and deployment processes .It is stated that automated development process assists to reduce the human effort and enable the automated deployment

according to the schedule.[7]

2.2.8 Robotic process automation

Robotic process automation (RPA) is a software technology that makes it easy to build, deploy, and manage software robots that emulate humans actions interacting with digital systems and software. It also increases employee satisfaction, engagement, and productivity by removing mundane tasks from their workdays. RPA is non-invasive and can be rapidly implemented to accelerate digital transformation. And it's ideal for automating workflows that involve legacy systems that lack APIs, virtual desktop infrastructures (VDIs), or database access. RPA technology can help organizations to improve efficiency, reduce costs, and increase accuracy by automating manual and repetitive tasks. IBM offers a range of RPA solutions that are designed to help organizations automate a wide variety of business processes, including finance and accounting, customer service, human resources, and supply chain management. IBM's RPA solutions are built on top of its AI-powered automation platform, IBM Automation, which provides a range of tools and capabilities for building, deploying, and managing software robots. One of the key benefits of IBM's RPA solutions is their ability to integrate with other IBM products and services, such as IBM Cloud Pak for Automation and IBM Watson, to provide a seamless end-to-end automation experience. IBM's RPA solutions are highly customizable and can be tailored to meet the specific needs and requirements of different industries and organizations.[8]

2.2.9 Ansible for automation

Ansible is a software tool that provides simple but powerful automation for cross-platform computer support. It is primarily intended for IT professionals, who use it for application deployment, updates on workstations and servers, cloud provisioning, configuration management, intra-service orchestration, and nearly anything a systems administrator does on a weekly or daily basis. Ansible is an open-source automation tool that can help businesses automate their IT processes. It allows organizations to streamline their workflows and reduce the time and effort required to complete routine tasks. Ansible uses a simple, YAML-based language that is easy to understand and learn, making it an accessible option for businesses of all sizes. One of the key benefits of Ansible is that it allows organizations to automate the deployment and management

of their IT infrastructure. This includes tasks such as provisioning servers, configuring network devices, and deploying applications. By automating these tasks, organizations can ensure that their systems are always up-to-date and running smoothly. Another benefit of Ansible is that it can help businesses improve their security posture. By automating security tasks such as vulnerability scans and software patching, organizations can reduce the risk of security breaches and ensure that their systems are always up-to-date and protected against the latest threats. Ansible can also help organizations save time and reduce costs by automating routine tasks such as software installations and updates. By automating these tasks, organizations can free up their IT staff to focus on more strategic initiatives, such as developing new applications or improving existing ones.[9]

2.2.10 Security and Compliance

Organizations carry out several activities to meet their objectives. The execution of each of these activities can imply tackling certain security risks. For example, when a web service is published to provide the products of an organization, data leakage or loss of confidentiality can occur, although these updates are essential for the modernization of the organization. Moreover, the activities are not executed solely in an isolated manner; they can be choreographed by using business processes models formed of a set of activities whose execution can imply tackling more complex security risks. Therefore, the analysis of the business processes is crucial to understanding the impact of the possible risks. In this work, risks refer to IT security risks. A risk is defined as the effects of uncertainty on the achievement of the goals (e.g.; data corruption or unauthorized access). The decision to execute a business process in a company to achieve its objective implies the acceptance of the derived risk (or even operational risks). This derived risk is a combination of single risks associated with the activities that conform to the process. The risk assessment of business process models is crucial to detecting potential security risks.[10]

Chapter 3

Methodology

ENTERPRISE CONTENT MANAGEMENT (ECM) and **BPA (Business Process Automation)** are two different but closely related concepts in IBM. ECM refers to the processes, technologies, and tools used to manage an organization's content throughout its lifecycle, from creation to archiving or disposal. ECM encompasses the capture, storage, retrieval, distribution, and management of content, including documents, records, images, and other forms of digital content. BPA, on the other hand, refers to the use of technology to automate business processes and workflows, streamlining operations, reducing errors, and improving efficiency. BPA can be used to automate any type of business process, from simple tasks such as data entry to complex, multi-step processes involving multiple systems and stakeholders.

In IBM, ECM and BPA are often used together to provide end-to-end solutions that enable organizations to manage their content and automate their business processes. For example, IBM's ECM solutions can be integrated with its BPA tools to automate document workflows, enabling organizations to route documents and tasks to the appropriate stakeholders, streamline approvals and review processes, and ensure compliance with industry regulations. The methodologies encourage a continuous improvement mindset, advocating for regular assessments, feedback gathering, and iterative enhancements to the ECM and BAW (Business Automation Workflow) solutions. This allows organizations to adapt to changing business requirements, technological advancements, and evolving user needs.

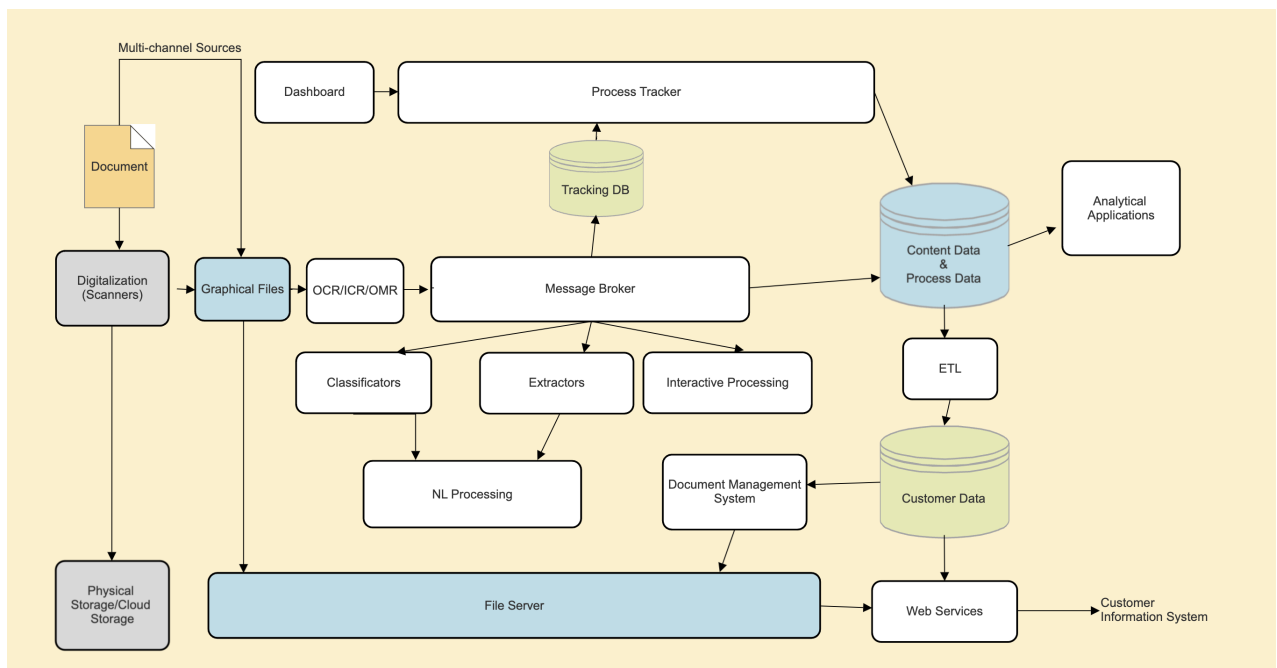


Figure 3.1: High-level architectural Diagram of ECM System

3.1 Module Description

3.1.1 Content Management

- Configure databases and repositories
- Capture, Recognise, Verify and Validate data from documents, store the metadata
- Authentication and authorization of users and groups, and work on permission granting, define security templates
- Event and Workflow Management
- Integrate different APIs as required for the business requirement
- Connect other content management products such as CMOD and Datacap

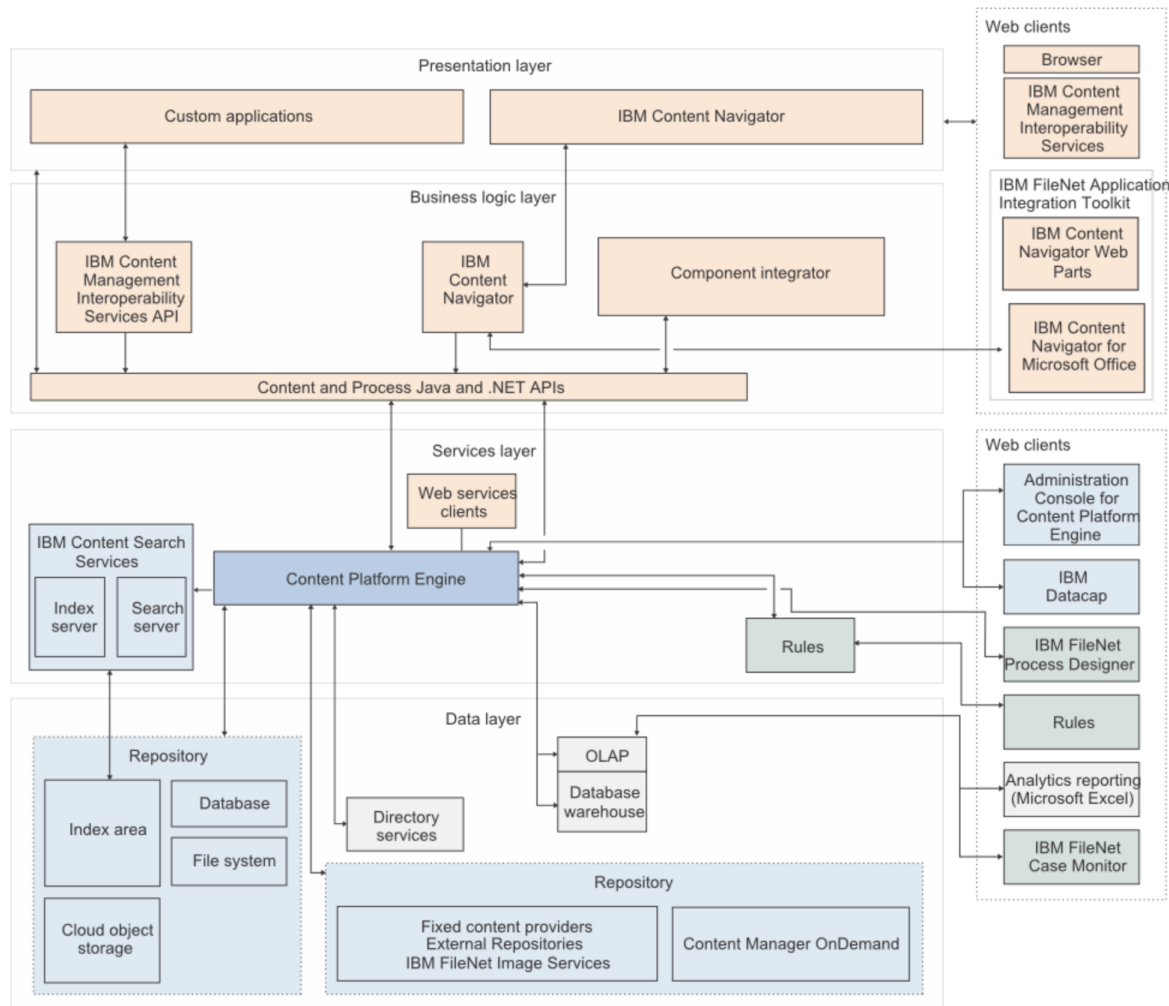


Figure 3.2: Module 1 flow chart

3.1.2 Process Management

- Define the work items in the business process involved
- Assign work items to different roles or group of users
- Define the work queue and design an efficient workflow
- Validate, Transfer and Launch the workflow
- Monitor the Process Instance and Event Logs
- Systematic management of the tasks

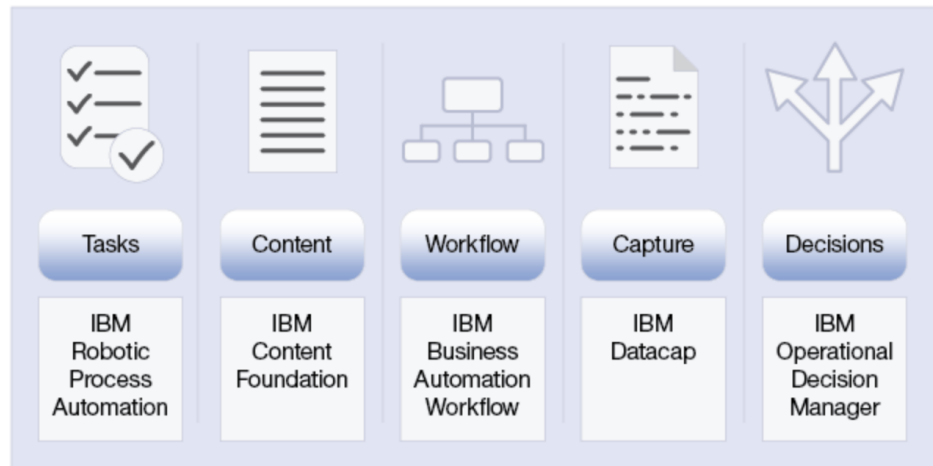


Figure 3.3: Module 2 flow chart

3.2 Business Process Automation

IBM offers a range of business process automation solutions that enable organizations to streamline workflows, improve productivity, and reduce costs. These solutions typically involve the use of software tools and technologies to automate and optimize business processes, such as customer service, procurement, and supply chain management. IBM's business process automation solutions include products such as IBM Business Automation Workflow, IBM Robotic Process Automation, and IBM Operational Decision Manager, among others. These solutions are designed to be flexible and adaptable, enabling organizations to customize their workflows to meet their specific business needs.

3.2.1 Working

A workflow engine tracks which steps an individual process instance currently resides in, who is assigned to work on a particular task, or which task needs to be claimed. A portal allows workflow participants to access their assigned tasks. Managers use the portal to visualize the current workload of their teams through performance dashboards and key performance indicators (KPIs). Certain tasks can be instrumented by displaying some appropriate content (documents) to help knowledge workers to complete a task or capture and store more information. Other tasks can use external services, such as AI-based services, to help the work of users. Tasks that involve data entry or retrieval from other user interfaces can be automated with robots that are triggered by the workflow itself.

The Workflow management architecture features the following functions:

- Allow business users to create and run their business processes on a single workflow management platform that supports all types of work: human and interactive workflows, case and content-centric ad hoc processes, and system-level, straight-through processing.
- Provide a single portal and user experience across all these workloads for business visibility and transparency.
- Orchestrate calls to other services and systems for increased automation.
- Capture operational data from the execution of these workflows to feed management Key Performance Indicators (KPIs) and dashboards, and derive business insights.
- Support both internal and external process participants.

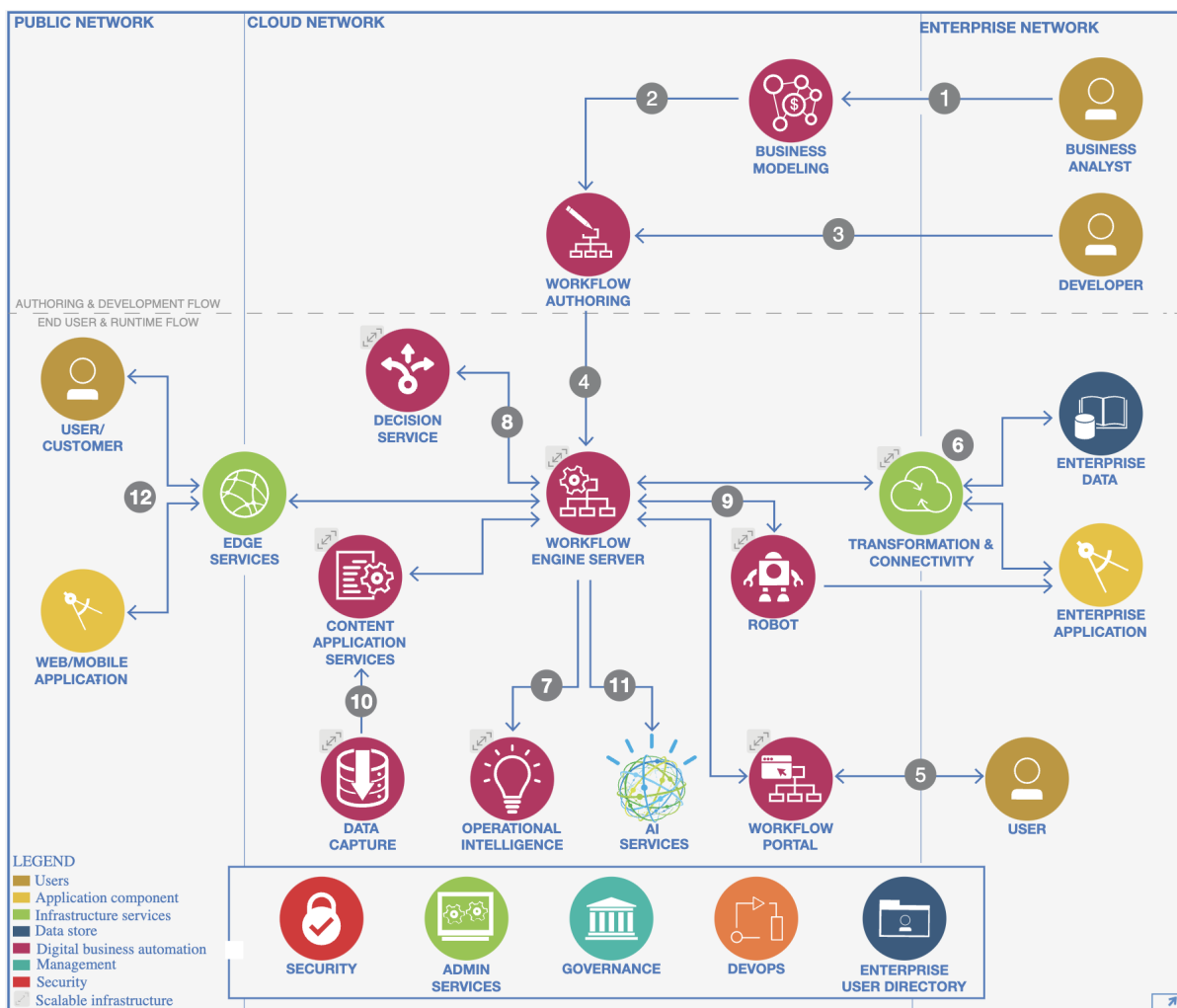


Figure 3.4: Business Process Automation working Diagram

- Provide DevOps capabilities to manage and quickly deploy changes to workflows for greater business agility and for meeting required governance and compliance objectives.

3.2.2 Steps Involved

Here are the general steps involved in a business process automation using IBM Business Automation Workflow:

1. A business analyst works with representatives of the line of business to discover and model business processes such as human workflows, ad hoc case processes, or straight-through processes.
2. The initial models can be imported into the workflow authoring environment as a starting point for more detailed modeling.
3. Within the workflow authoring and development environment, developers define business objects, user interfaces, interfaces to external services, applications, and systems of record.
4. By using the DevOps capability of the platform, workflow applications are deployed into a server that is running workflow engines.
5. As users of the workflow solution, knowledge workers participate in the business process through a workflow portal. The portal provides prioritized task lists and user interfaces to claim, work on and release a task, and work on a case. Within the same portal, managers can access performance dashboards and KPIs for their team.
6. A workflow application typically interacts with external systems of record and enterprise applications or services.
7. An operational intelligence capability captures events related to the execution of workflows, logs them in a scalable manner, and provides business performance analytics through interactive tools and dashboards. A workflow application can optionally use adjacent capabilities shown in steps 8 through 12.
8. Optionally, the workflow application can call decision services to automate decision tasks.

9. The workflow application can orchestrate the activation and execution of robots to automate manual tasks in the workflow.
10. The workflow application can interact with documents that are managed in a content management platform or by using data that is digitized through some data capture capability.
11. Optionally, the workflow application can call AI services to assist users or enrich business data.
12. While most workflow applications are internal-facing, certain workflows involve external participants or systems that can interact with the workflow solution over the internet through secured edge services.

3.2.3 Automate using Ansible

Here are the high-level steps to use Ansible to automate a business process:

1. Identify the business process to be automated and its requirements.
2. Map out the process flow and create a workflow diagram.
3. Define the inputs, outputs, and dependencies of each step in the process.
4. Install Ansible on the relevant servers and configure the Ansible control node.
5. Identify the Ansible modules needed for the process and install them.
6. Write Ansible playbooks to automate each step of the process.
7. Test the playbooks on a staging environment to ensure they work as expected.
8. Implement error handling and recovery mechanisms in the playbooks.
9. Configure the playbooks to notify relevant parties of any errors or issues.
10. Integrate the playbooks with any existing monitoring or alerting systems.
11. Deploy the playbooks to the production environment.
12. Monitor the process to ensure it is running smoothly and identify areas for optimization.

13. Analyze data collected by Ansible to identify areas for optimization.
14. Continuously refine and optimize the playbooks based on feedback and data.
15. Document the automated process and playbooks for future reference and maintenance.

3.3 System Specifications

The application development architecture recognized for this project is specified in this section on the basis of requirements.

3.3.1 Software Specification

- Cloud service used : IBM Cloud
- ECM Solution : IBM FileNet P8 Platform, ACCE, ICN
- Workflow Designer: Process Designer
- Web Browser : Any web browser
- Document Archive Tool : CMOD, Data Capture and Recognition : IBM Datacap
- Application Server : WebSphere
- Database : IBM Db2

3.3.2 Software Description

IBM Cloud

IBM Cloud is a suite of cloud computing services that enables businesses to build, deploy, and manage applications and services in the cloud. It offers a range of infrastructure, platform, and software as a service (IaaS, PaaS, and SaaS) offerings, as well as hybrid cloud capabilities. IBM Cloud is designed to provide businesses with the flexibility, security, and scalability they need to succeed in today's digital world

Features:

- **Comprehensive cloud offerings:** IBM Cloud provides a broad range of cloud services, including infrastructure as a service (IaaS), platform as a service (PaaS), software as a service (SaaS), and hybrid cloud options. This allows businesses to choose the services that best meet their needs and customize their cloud environment to fit their specific requirements.
- **AI and data analytics:** IBM Cloud includes a range of artificial intelligence (AI) and data analytics tools that enable businesses to extract insights from their data, automate processes, and make better decisions. These tools include Watson AI, Data Science Experience, and Cloud Pak for Data.
- **Security :** IBM Cloud offers advanced security and compliance features to help businesses protect their data and applications in the cloud. These features include identity and access management (IAM), encryption, and compliance with industry and regulatory standards. Environmental setup.
- **Openness and interoperability:** IBM Cloud is designed to be open and interoperable, allowing businesses to integrate their existing systems and applications with the cloud. It supports multiple programming languages and frameworks, and offers APIs and tools that enable developers to build and deploy applications quickly and easily.

ECM Solution : FileNet P8 Platform

FileNet P8 is an enterprise content management platform offered by IBM. It provides a scalable and modular architecture for managing all types of content and automating business processes. FileNet P8 includes a range of tools and services for document management, workflow automation, records management, and compliance. It also provides integration capabilities with other IBM ECM solutions, as well as third-party applications and systems. FileNet P8 is used by organizations of all sizes in various industries, including healthcare, financial services, government, and manufacturing, to manage their content and streamline their business processes.

Components

- **The Administrative Console for Content Engine (ACCE)** is a web-based administration tool for managing the IBM FileNet Content Engine component of FileNet P8. The ACCE provides a user-friendly interface for performing administrative tasks, such as configuring

security settings, managing storage areas, and monitoring system performance. The ACCE includes a range of features that enable administrators to manage the content stored in FileNet P8 efficiently. These features include the ability to manage document classes, create custom object stores, and configure workflows. The ACCE also provides access to system logs and performance metrics, enabling administrators to monitor system health and diagnose issues quickly.

In addition to its administrative capabilities, the ACCE provides integration capabilities with other IBM and third-party applications. It includes a range of APIs and web services that enable developers to integrate the ACCE with external applications and systems.

Overall, the Administrative Console for Content Engine is a critical tool for managing the IBM FileNet Content Engine component of FileNet P8, and is essential for ensuring the efficient and effective management of content in the enterprise.

- IBM Content Navigator is a web-based user interface and content management system that provides a unified view of all IBM ECM repositories, including IBM FileNet Content Manager, IBM Case Manager, and IBM Content Foundation.

With IBM Content Navigator, users can access and manage content from a single location, regardless of which IBM ECM repository the content is stored in. The interface is customizable, so organizations can tailor it to meet their specific needs and workflows.

IBM Content Navigator provides a range of features to improve productivity and streamline content management workflows. These features include advanced search capabilities, collaboration tools, and workflow automation. Users can also perform actions on content, such as check-in, check-out, version control, and annotations, directly from the interface.

In addition to its core features, IBM Content Navigator provides a range of customization and integration capabilities. Developers can use the IBM Content Navigator API and software development kit (SDK) to create custom plugins, workflows, and applications that integrate with IBM ECM repositories and other enterprise applications.

Overall, IBM Content Navigator is a powerful content management system that provides a unified interface and a range of features to improve productivity and streamline content management workflows in organizations that use IBM ECM solutions such as FileNet.

Workflow Designer : Process Designer

Process Designer is a graphical tool for creating and managing business process workflows in IBM FileNet Business Process Manager (BPM), which is a component of the IBM FileNet P8 platform.

With Process Designer, users can design and modify business processes using a visual interface that simplifies the process design and configuration process. Process Designer supports a range of workflow types, including sequential, parallel, and ad-hoc workflows, and provides a range of built-in activities that can be used to automate tasks within a workflow.

Process Designer also supports custom activity development, enabling developers to create custom activities that can be used in a workflow. These custom activities can be created using a range of programming languages, including Java and JavaScript.

Features:

- **Graphical interface:** Process Designer provides a visual, drag-and-drop interface for designing business processes. Users can create and modify process flows using a range of built-in activities and connectors, simplifying the process design process.
- **Custom activity development:** Process Designer supports custom activity development, enabling developers to create custom activities that can be used in a workflow. These custom activities can be created using a range of programming languages, including Java and JavaScript.
- **Workflow testing:** Process Designer includes a Process Simulator that allows users to test workflows without actually running them. This feature enables users to simulate a workflow and test its functionality before deploying it.
- **Built-in activities:** Process Designer includes a range of built-in activities that can be used to automate tasks within a workflow. These activities include user tasks, system tasks, and email notifications, among others.
- **Deployment tools:** Process Designer includes a deployment tool that enables users to deploy workflows to IBM BPM servers. This tool provides a range of options for configuring workflows, including process definitions, process instances, and process data.

- Integration with other tools: Process Designer can be integrated with other tools, such as IBM Case Manager and IBM Content Navigator, enabling users to create custom workflows that integrate with other IBM ECM solutions.

Document Archival and Data capture

IBM CMOD (Content Manager OnDemand) is an enterprise archiving and report management system that allows organizations to store and manage large volumes of data and documents. It enables users to quickly retrieve information, generate reports, and archive documents for long-term storage. IBM CMOD supports a range of file formats and integrates with other IBM ECM solutions, such as IBM FileNet and IBM Content Navigator.

Features:

- Archiving and retrieval: IBM CMOD provides a powerful archiving and retrieval system that enables users to store and manage large volumes of data and documents. Users can easily retrieve information from the system using a range of search and retrieval options..
- Report management: IBM CMOD provides a range of features for report management, including the ability to generate, store, and distribute reports. The system supports a range of report formats, including PDF, XML, and HTML.
- Scalability and performance: IBM CMOD is designed to be highly scalable and to deliver high performance even with large volumes of data. The system is built on a distributed architecture that enables users to easily add capacity as needed.
- Integration with other IBM ECM solutions: IBM CMOD integrates seamlessly with other IBM ECM solutions, such as IBM FileNet and IBM Content Navigator. This integration enables users to easily access and manage data and documents across multiple systems, streamlining business processes and improving productivity.

Application Server : Websphere

WebSphere is a set of Java-based tools from IBM that allow developers to create and manage Java-based web applications and services. It includes a range of components, such as application servers, web servers, and development tools. WebSphere supports a wide range of programming languages, frameworks, and operating systems, making it a popular choice for enterprise web application development.

Features:

- **Application server:** WebSphere includes an application server that enables developers to create, run, and manage Java-based web applications and services. The application server provides a range of features, including scalability, high availability, and security.
- **Web server:** WebSphere also includes a web server that enables developers to deploy and manage web applications. The web server provides a range of features, including load balancing, SSL encryption, and reverse proxy support.
- **Development tools:** WebSphere provides a range of development tools that enable developers to create and test web applications. These tools include an integrated development environment (IDE), debugging tools, and testing frameworks.
- **Integration:** WebSphere is designed to integrate with other IBM solutions, such as IBM MQ and IBM DB2. This integration enables developers to easily access and manage data and services from these systems, streamlining development and improving productivity. WebSphere also supports a wide range of programming languages and frameworks, making it a flexible and versatile platform for enterprise web application development.

Database : IBM Db2

IBM Db2 is a database management system that provides a comprehensive set of tools for managing and storing data. It is designed to support large-scale enterprise applications, including transaction processing, data warehousing, and analytics. Db2 offers a range of features, including high availability, security, and scalability, as well as support for a wide range of data types and programming languages. It integrates seamlessly with other IBM solutions, such as IBM Cloud Pak for Data and IBM Watson, to provide a complete data management and analytics platform.

Features:

- **High availability and disaster recovery:** IBM Db2 provides a range of features for high availability and disaster recovery, including clustering, replication, and failover capabilities. This ensures that mission-critical applications and data are always available and protected.
- **Advanced security:** Db2 includes advanced security features, such as fine-grained access control, encryption, and auditing, to help organizations protect their data from unauthorized access and cyber threats.

- Scalability and performance: IBM Db2 is designed to handle large-scale enterprise applications and workloads. It supports a wide range of data types and programming languages, and can handle complex queries and analytics.
- Integration with other IBM solutions: Db2 integrates seamlessly with other IBM solutions, such as IBM Cloud Pak for Data and IBM Watson, to provide a complete data management and analytics platform. This integration enables users to easily access and manage data across multiple systems, streamlining workflows and improving productivity.

3.4 System Design

System Design for a demo business process, which is loan Application

3.4.1 Architectural Design

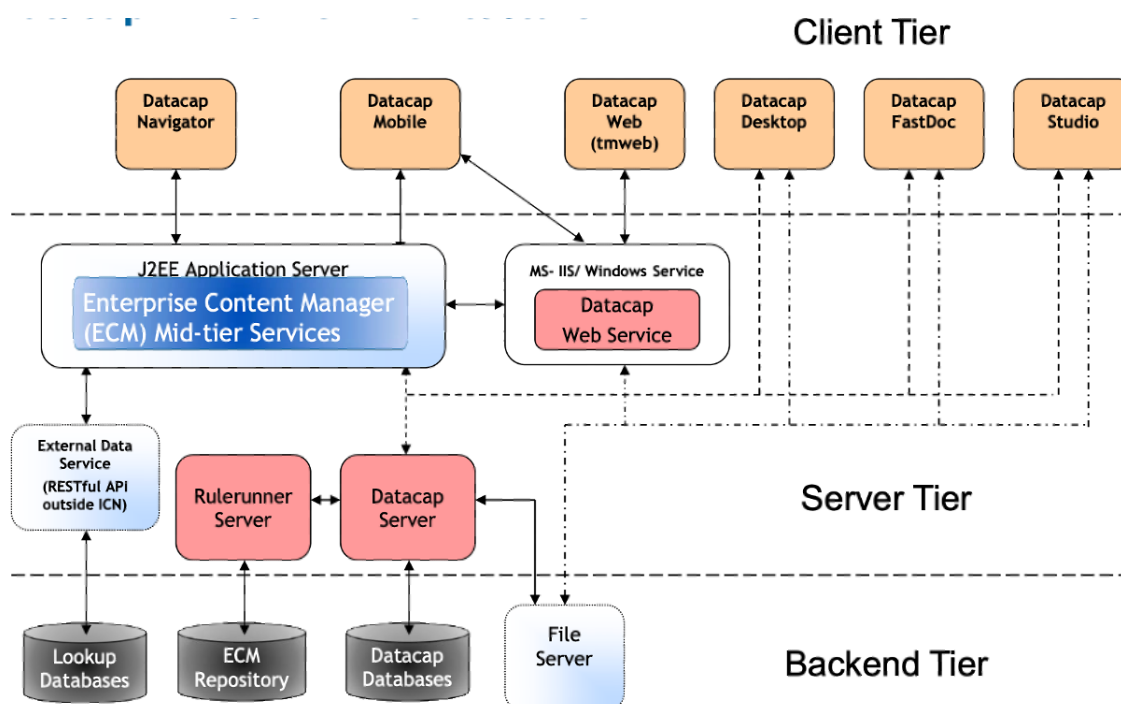


Figure 3.5: Architectural Design of DataCap - Data Capture, Recognition, Validation Verification

The architecture of Datacap is divided into three main components: Datacap Client, Datacap Server, and Datacap Reporting. Datacap Client is a desktop application that allows users to scan documents and perform manual data entry tasks. Datacap Server is the central

processing engine that handles all of the document capture and processing tasks. It is responsible for processing images, extracting data, and routing documents to their final destinations. Datacap Server includes a number of modules that can be used to enhance its functionality, such as OCR (Optical Character Recognition), ICR (Intelligent Character Recognition), and barcode recognition. Datacap Reporting is a set of tools that provides reporting and analytics capabilities for Datacap Server. It allows users to monitor system performance, track document processing times, and generate custom reports.

3.5 User Interface Design

ECM provides several user interfaces that allow users to interact with the system and manage documents and data.

- **Personalized Dashboard:** IBM ECM provides a personalized dashboard that allows users to access the information and functions they need most frequently. The dashboard can be customized to display relevant information and quick links to frequently used features.
- **Advanced Search Capabilities:** IBM ECM includes advanced search capabilities that allow users to quickly find documents and data within the system. Users can search by various criteria such as document type, metadata, keywords, and more.
- **Document and Folder Management:** IBM ECM provides users with the ability to manage documents and folders within the system. This includes creating, editing, deleting, and moving documents and folders, as well as assigning metadata and permissions.
- **Mobile Access:** IBM ECM provides mobile access to the system, allowing users to access and manage documents and data from their mobile devices.
- **Workflow Management:** IBM ECM includes powerful workflow management capabilities that allow users to create, manage, and track workflows for document and data processing. This includes creating automated workflows, routing documents for approvals, and tracking workflow progress.

Chapter 4

RESULT AND DISCUSSION

ECM systems can vary depending on the specific organization and the implementation of the ECM solution. However, in general, ECM systems can provide several benefits, such as improved collaboration, increased productivity, better control over information, and reduced costs associated with manual processes. ECM solutions can help organizations to improve decision-making by providing access to accurate and up-to-date information. With the ability to manage content across multiple channels and systems, ECM solutions can also help to improve customer service and satisfaction. However, to fully realize these benefits, organizations must ensure that their ECM system is properly designed, implemented, and tested. Adequate training and support for users is also critical to ensure that the system is being used to its full potential. Additionally, regular monitoring and maintenance are necessary to ensure that the system is performing optimally and that data is being stored and managed securely. Overall, the use of ECM systems can have a positive impact on an organization's efficiency, productivity, and bottom line. However, it is important to carefully consider the specific needs of the organization and to select and implement an ECM solution that is tailored to those needs to fully realize the benefits.

4.1 Testing and its types used

Testing is an essential aspect of ECM IBM systems because it ensures that the system works as intended and meets the organization's requirements. Some of the key importance of testing in ECM IBM include:

1. Ensures system reliability, Increases system usability: Testing can help identify usability

issues in the system, such as confusing interfaces or unintuitive workflows. By addressing these issues, the system's usability can be improved, making it easier for users to work with the system.

2. Enhances system security: Testing can help identify security vulnerabilities in the system, such as weak authentication mechanisms or data leakage issues. By identifying and addressing these issues, the system's security can be enhanced, ensuring that sensitive data is protected, Reduces system downtime.

4.1.1 Functional testing

Functional testing in ECM IBM is a method to test whether the system is working according to the functional requirements or not. Here are some steps to perform functional testing in ECM IBM:

- Identify the functional requirements, Develop test cases, Execute test cases
- Report defects, Retest, Validate the results, Regression testing
- Verify user interface, Verify performance

4.1.2 Regression Testing

Regression testing is an important aspect of software testing in ECM IBM as it helps to ensure that changes made to the system do not adversely affect existing functionality. Here are the general steps for conducting regression testing in ECM IBM:

- Identify the scope of the regression test , Identify test cases , Execute test cases , Verify defects, Debug and fix defects - once verified, debug the defects and fix them. The fixes should be tested thoroughly to ensure that they have not introduced any new issues.
- Retest fixed defects - once the defects have been fixed, they should be retested to ensure that the fixes have resolved the issues.

4.1.3 Security Testing

Security testing is an essential part of ECM IBM testing, ensuring the safety and protection of sensitive data. Here are the steps involved in conducting security testing in ECM IBM:

- Identify the scope of the security testing, including the specific ECM IBM components and their interdependencies.
- Analyze the potential vulnerabilities and threats that could exploit the ECM IBM system.
- Develop a comprehensive test plan, including the security testing methodology, tools, and techniques.

4.1.4 Integration Testing

Integration testing in ECM IBM involves testing the integration of the ECM system with other systems or applications. The objective is to ensure that data and processes can flow smoothly between different systems without any issues.

- Identify the systems or applications that need to be integrated with the ECM system
- Determine the integration points and the data flow between the systems
- Develop test cases to verify the integration of the systems
- Execute the test cases and capture the test results
- Ensure that the data is secured during the transfer and not compromised

4.2 Test cases in IBM FileNet Content Management

1. Test creating new documents with different file types (e.g., PDF, Word, Excel) and ensure successful upload and storage.
2. Verify that document properties (metadata) are correctly captured and associated with the documents.
3. Test versioning functionality by updating documents and ensuring the correct version history is maintained.
4. Validate document retrieval and viewing capabilities. Workflow and Business Processes:
5. Test initiating and executing workflows by ensuring documents move through the defined workflow steps accurately.

6. Verify that notifications and escalations are triggered appropriately during workflow execution.
7. Test the ability to assign tasks to users or groups and ensure proper task completion and reassignment.
8. Validate that workflow performance meets the expected response times and throughput.
9. Test basic and advanced search functionality to locate documents based on metadata, content, or combinations of search criteria.
10. Validate search result accuracy and relevancy.
11. Test search filters and sorting options to ensure correct document filtering and ordering.
12. Verify that saved searches and query templates work as intended.
13. Test user authentication and authorization mechanisms by verifying that only authorized users can access specific documents or perform certain actions.
14. Validate user and group permissions to ensure proper access restrictions are enforced. Test user roles and privileges to ensure they align with the defined security policies.
15. Verify that security settings are applied consistently across the system.
16. Test integration points with other systems, such as CRM or ERP, to ensure data exchange and synchronization work correctly.
17. Validate the functionality of APIs, web services, or connectors used for integration.
18. Test the import and export of documents and metadata between FileNet and external systems.
19. Verify that integration-related error handling and logging are functioning as expected.
20. These are just a few examples, and the specific test cases you create will depend on your organization's requirements and use cases for FileNet. It's important to consider functional, non-functional, and edge cases to ensure comprehensive testing coverage.

4.3 Output Screens and Results

1. IBM FileNet Content Engine Interface:

This is the console for users to access and manipulate documents stored in FileNet, as well as create and modify workflows for managing the document lifecycle.

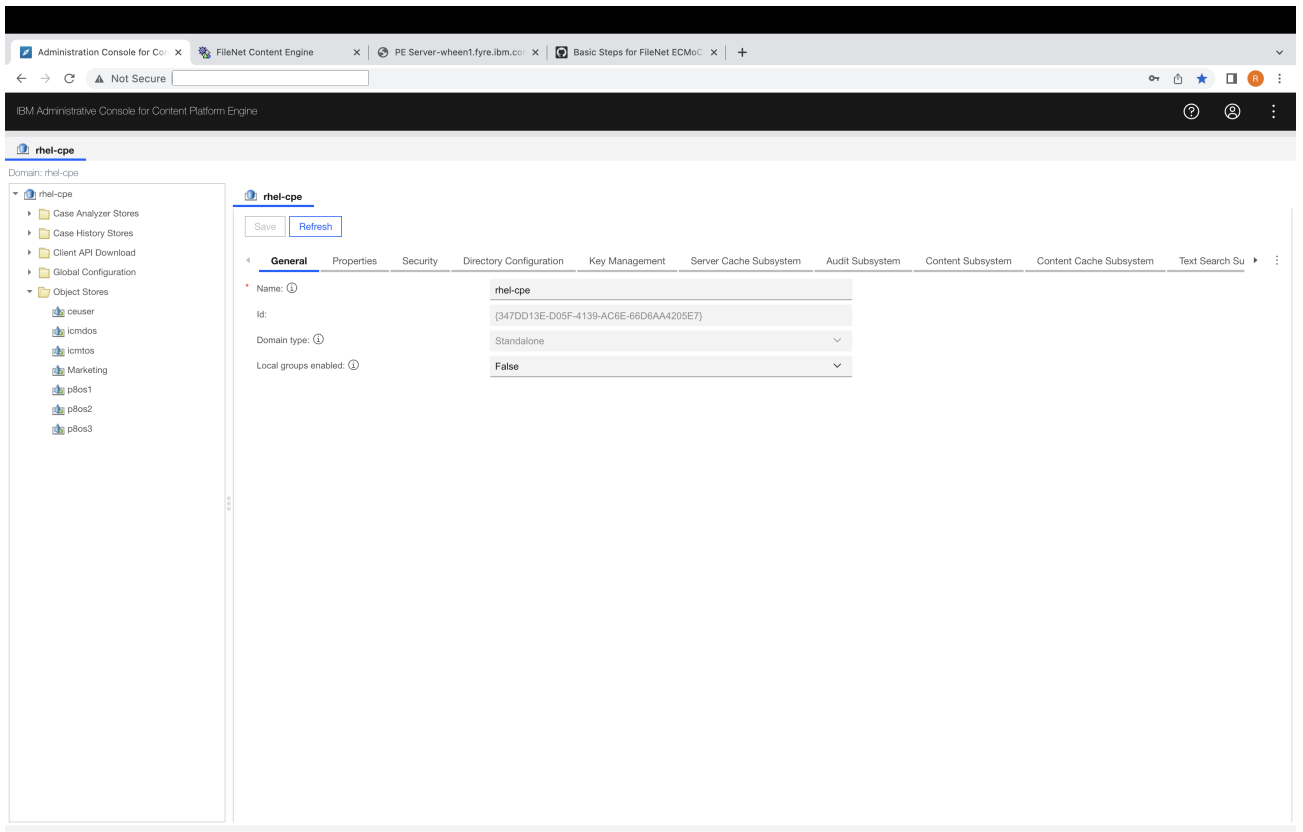


Figure 4.1: ACCE Console: IBM FileNet P8

2. IBM FileNet ICN Interface

This is a web-based interface that provides a unified view for accessing and managing content from different enterprise content management systems, including FileNet P8. It offers users a customizable, modern, and intuitive interface for searching, viewing, and collaborating on documents and workflows.

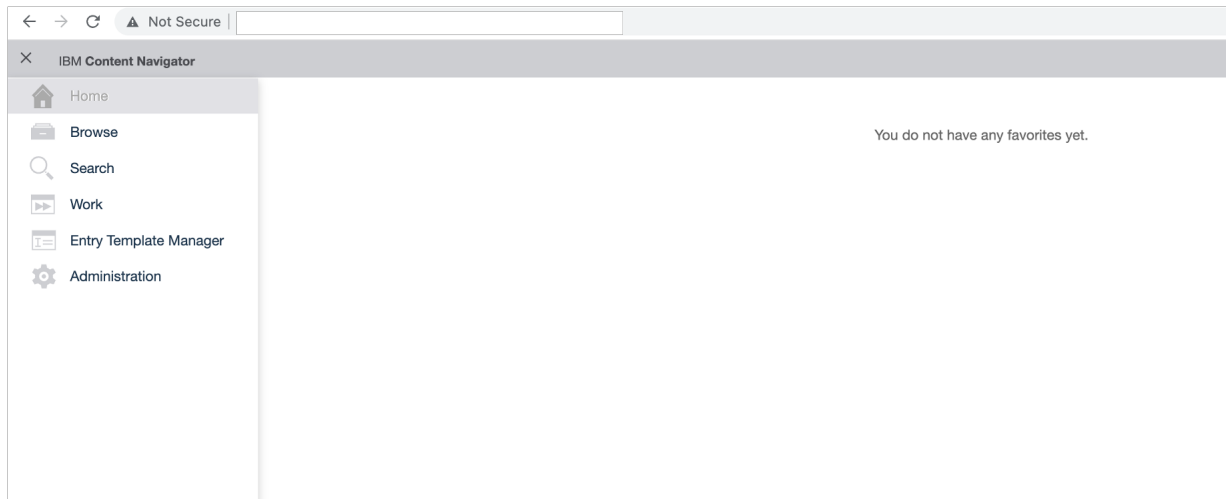


Figure 4.2: ICN : IBM FileNet P8

3. Datacap Studio Interface

This is a graphical user interface used for designing and testing document capture and processing workflows in IBM Datacap. It provides a drag-and-drop interface for creating processing rules, mapping fields, and configuring the document recognition and validation process.

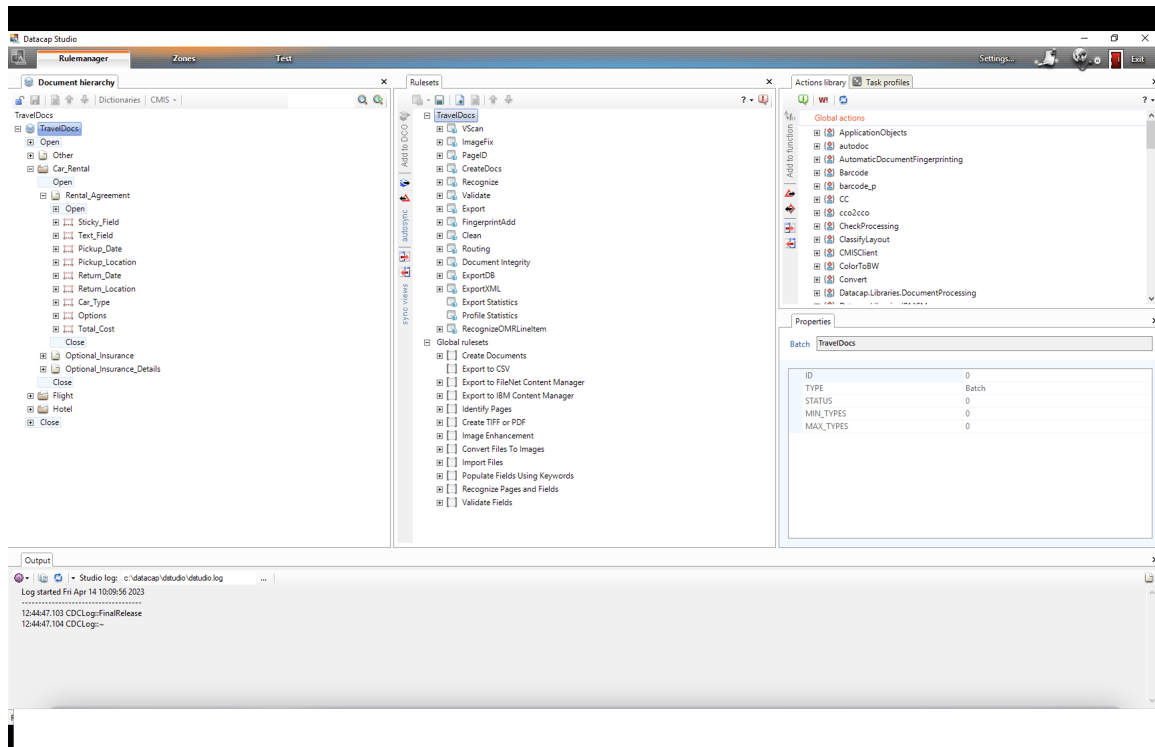


Figure 4.3: IBM Datacap Console

4. CMOD Ondemand Administrative Client

This is a desktop application used for managing and administering the CMOD system. It provides a graphical user interface for configuring and managing CMOD servers, databases, storage, security, and other system settings.

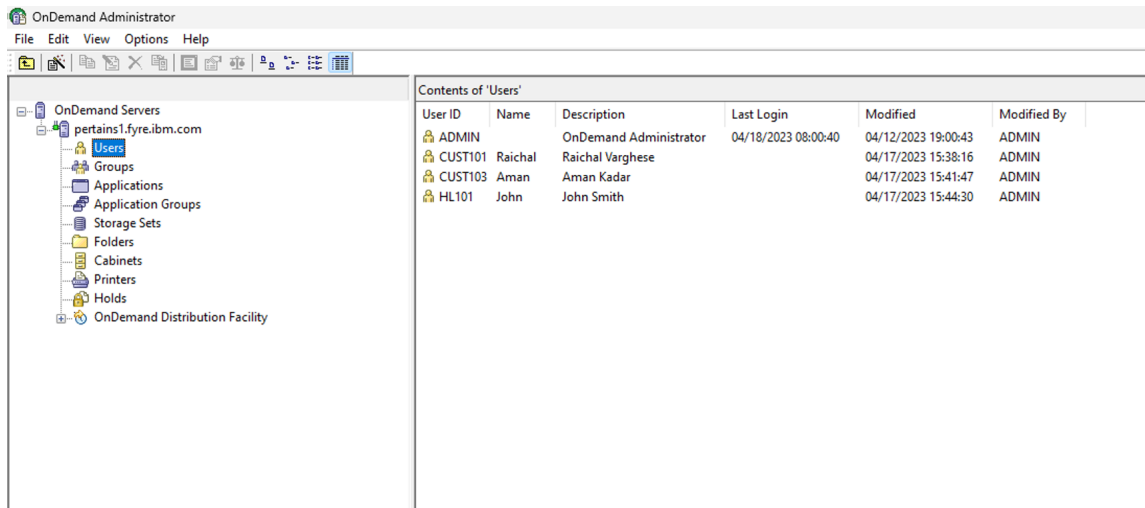


Figure 4.4: IBM CMOD Ondemand Administrative Client Console

5. Websphere Application Server

This is the a web-based interface used for managing and configuring IBM WebSphere Application Server instances. It provides a graphical user interface for configuring and deploying applications, managing servers and clusters, and monitoring server health and performance.

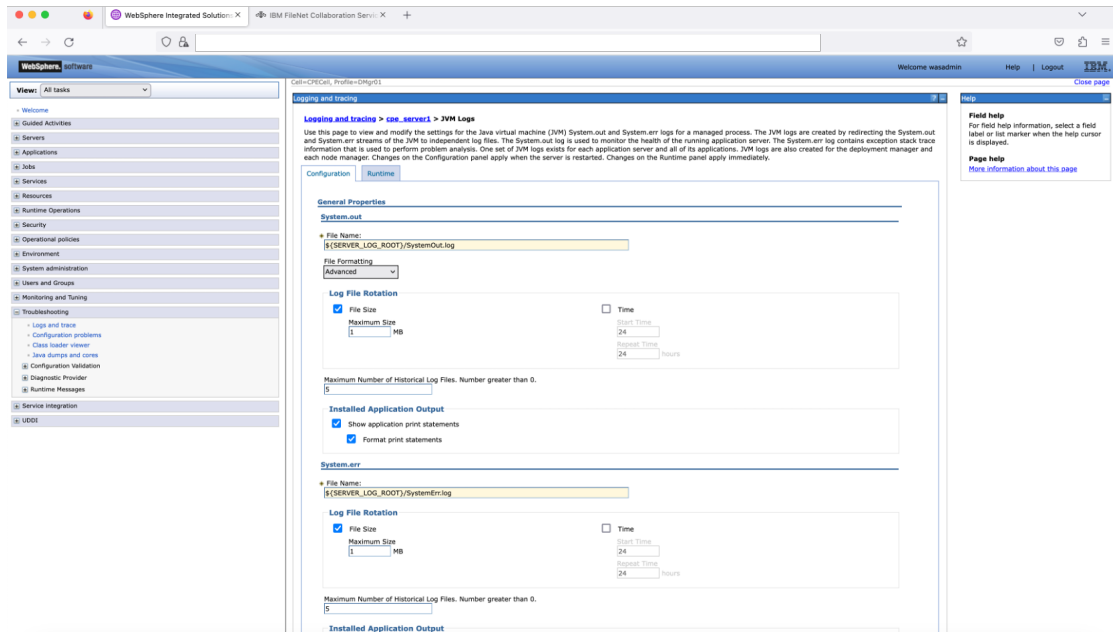


Figure 4.5: IBM Websphere Application Server Console

Chapter 5

CONCLUSION

As enterprises adapt to the growing volume of digital content and real-time information processing, the innovative use of ECM becomes more integral to the organizational IT strategy of capturing, organizing, processing and maintaining digital content becomes increasingly relevant. The increasing volume, complexity and diversity of digital content makes ECM technology an essential component of organizational IT. Furthermore, the necessity and importance of making quick and accurate decisions in today's dynamic environment positions ECM in a strategic role for decision support. The objective of this study was to improve our understanding of the decision support capabilities of ECM in an organization.

5.1 Future Enhancement

IBM is constantly working to enhance its ECM solutions to better serve the needs of its customers. Here are some potential future enhancements for IBM ECM:

- Cloud-based solutions:** As more organizations move their operations to the cloud, IBM ECM solutions may offer more cloud-based options for its customers. This could include cloud-based storage, processing, and workflow management, as well as enhanced security and compliance features.
- AI and Machine Learning:** IBM may incorporate more advanced artificial intelligence and machine learning features into its ECM solutions to improve automation and data analysis capabilities. This could include intelligent data capture, automated document classification, and predictive analytics.
- Improved User Experience:** IBM may focus on improving the user experience for its ECM solutions by offering more intuitive user interfaces, mobile-friendly options, and simplified workflows.

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APPENDIX

Screenshots

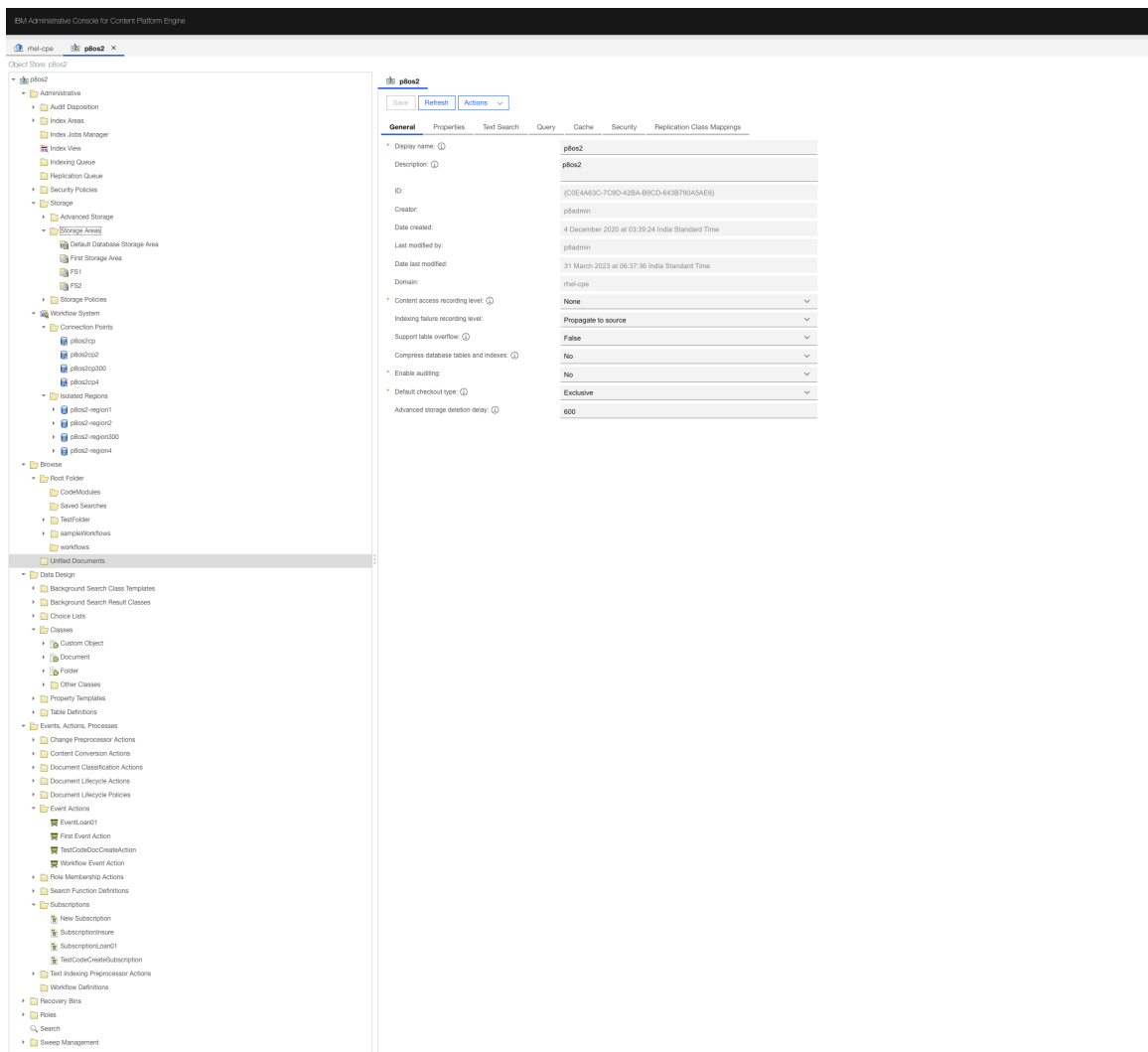


Figure A.1: Administrative Console

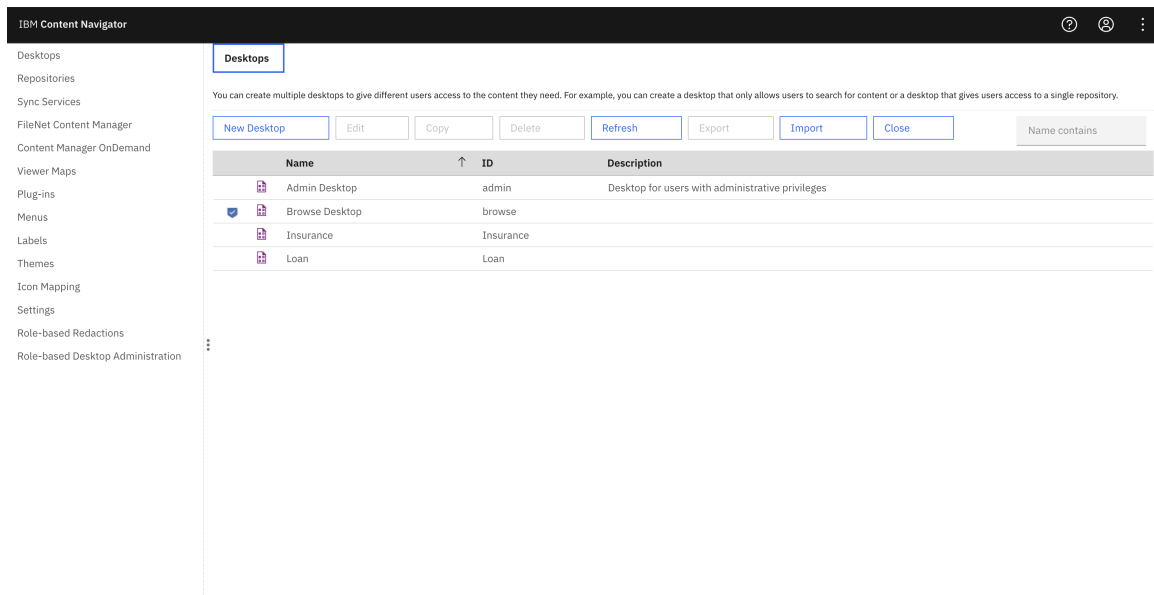


Figure A.2: Web based Client Console

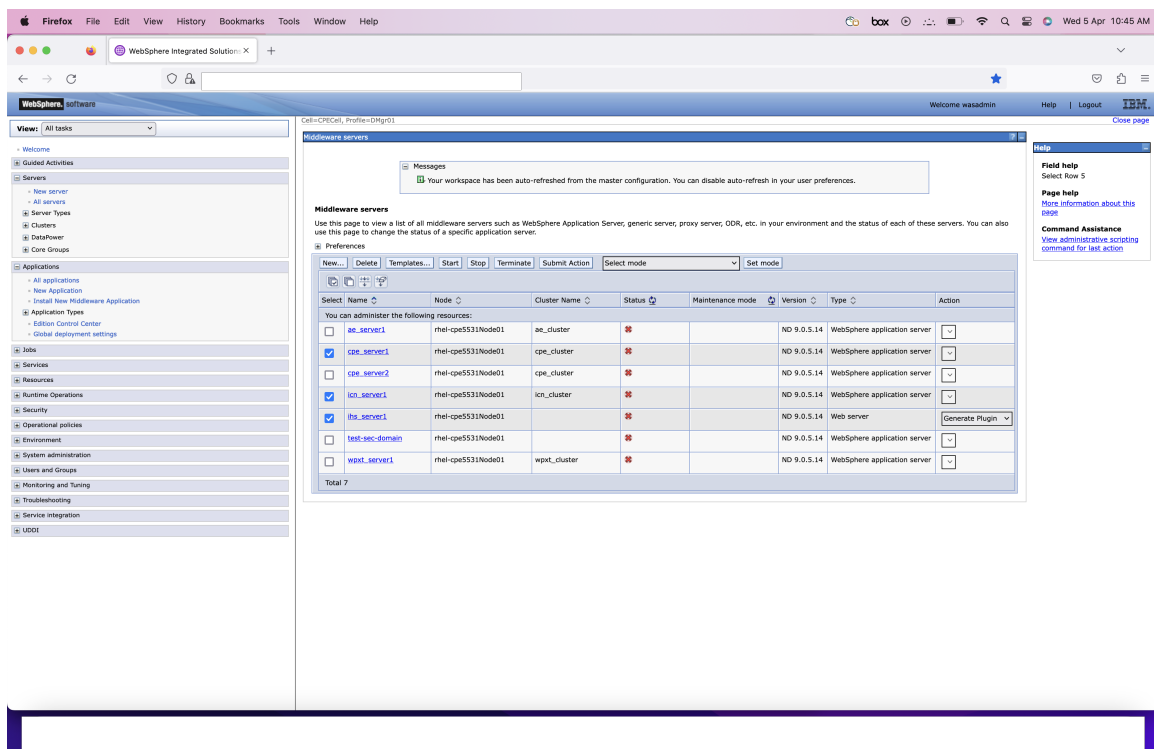


Figure A.3: Application Server Interface - Websphere

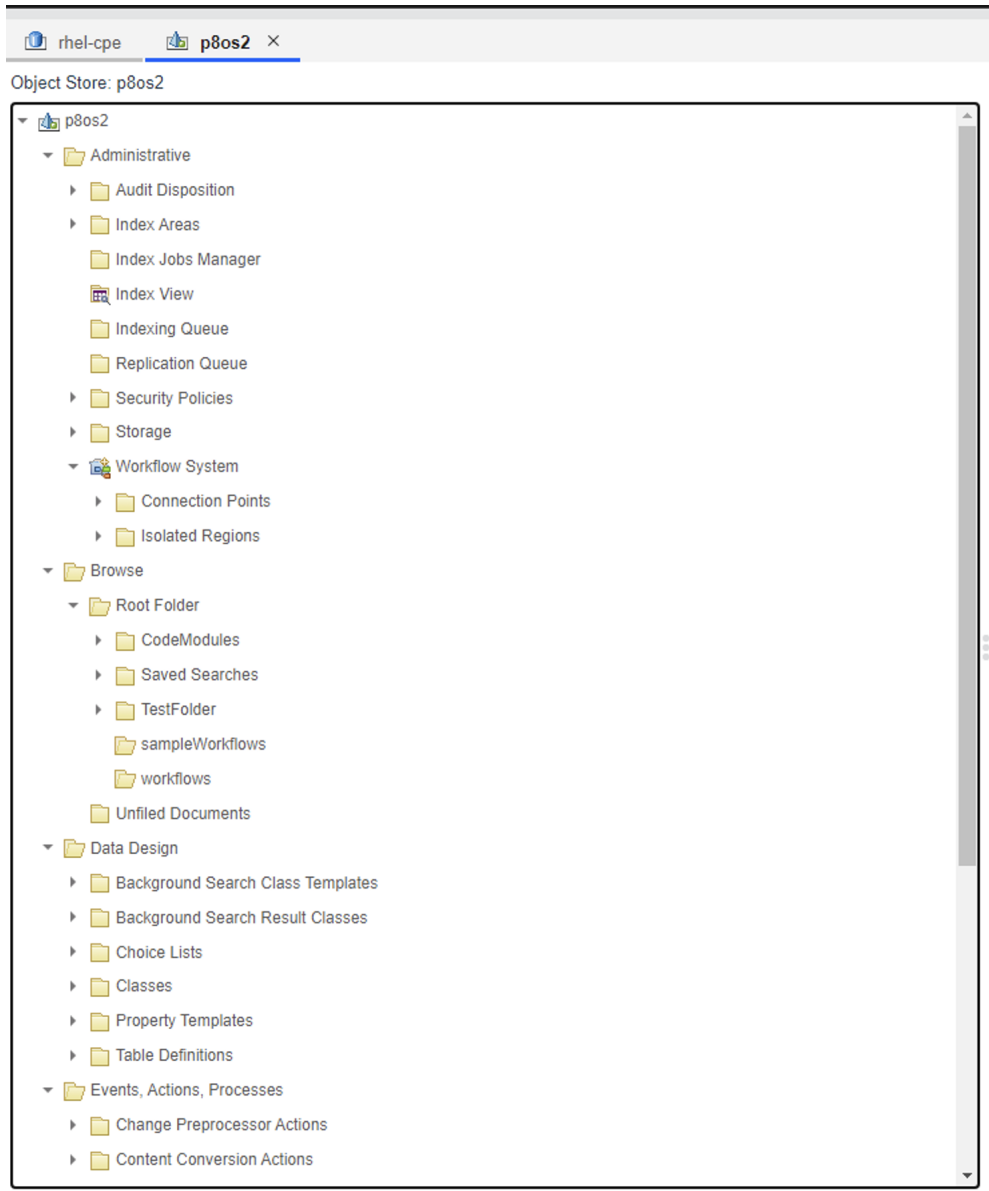


Figure A.4: Content Mangement Files

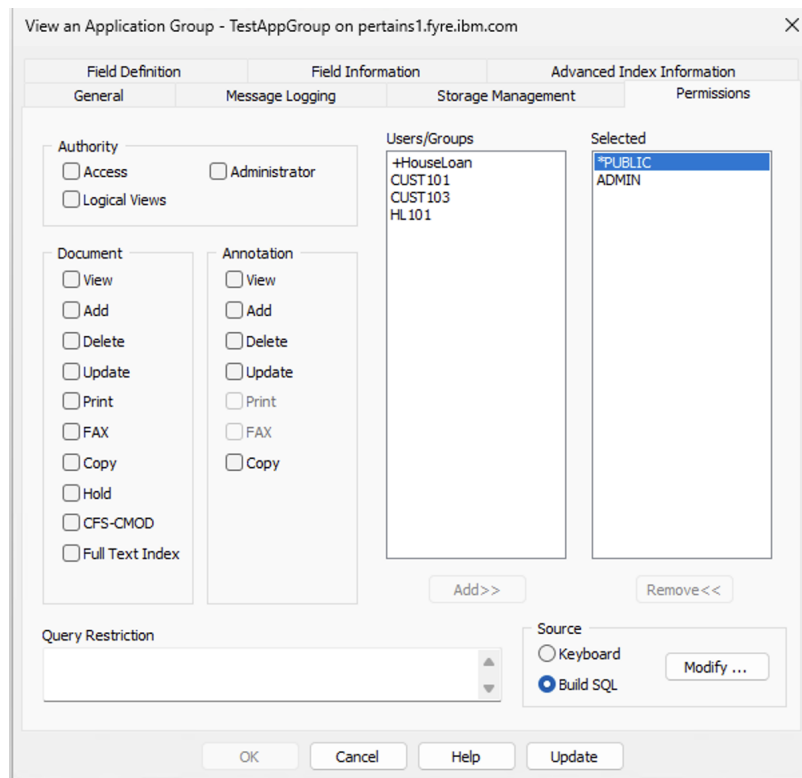


Figure A.5: Permission Granting in CMOD

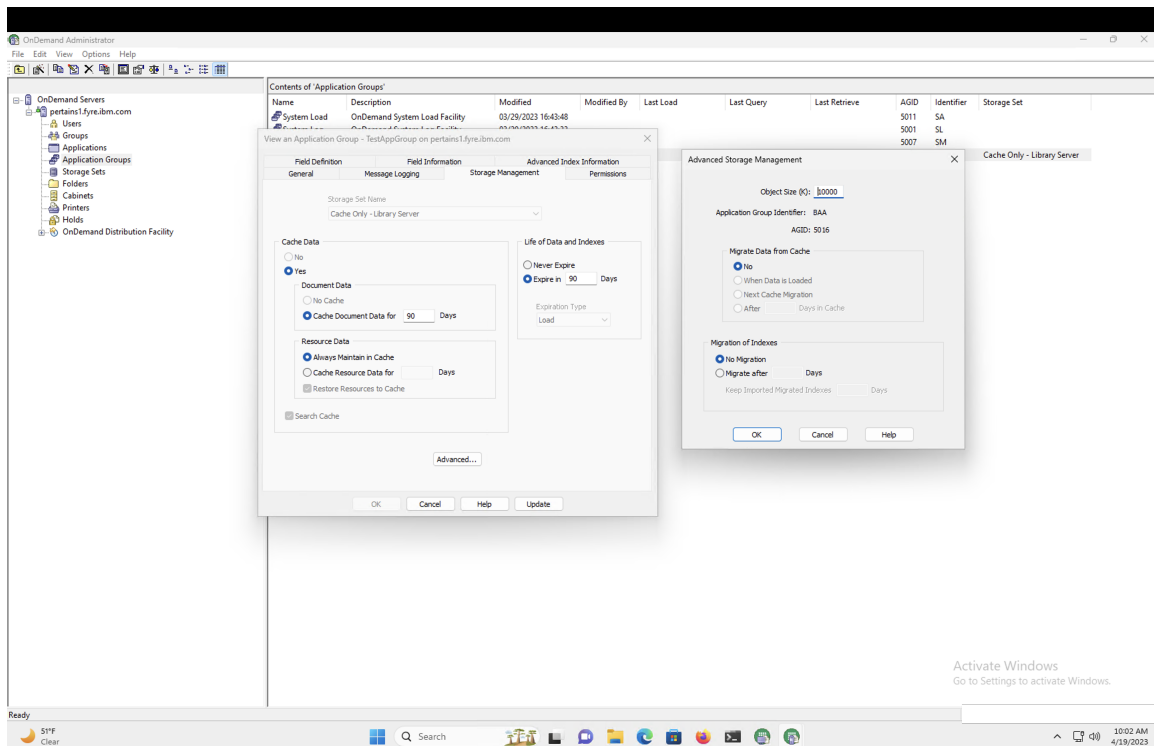


Figure A.6: CMOD Administrator Interface

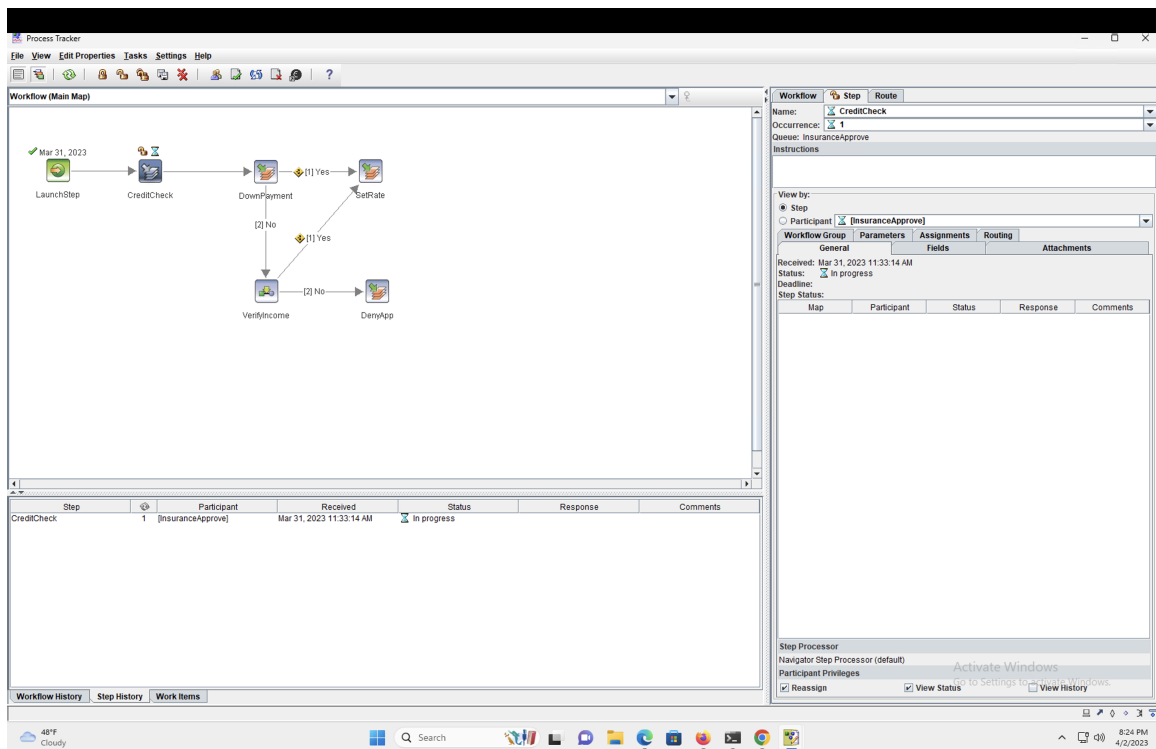


Figure A.7: Workflow Design of a Loan Application in Process Designer

The screenshot shows the 'Process Administrator' application. The search criteria are set to:

- Look for: Workflows
- In: Workflow Roster
- Select one: DefaultRoster
- Search Fields: F_WorkNum (String)
- Operator: is equal
- Value: (empty)

The results table below shows the following data:

	F_WorkNum	F_Originator	F_WorkFlowNumber	F_StartTime	F_Subject
1	14E3D2D83476CC409991EE879F8CA71F	50 (p8admin)	14E3D2D83476CC409991EE879F8CA71F	Mar 31, 2023 11:33:14 AM	
2	59D9CC214D056148BFBA1C4400A58722	50 (p8admin)	59D9CC214D056148BFBA1C4400A58722	Mar 31, 2023 12:10:58 PM	

Figure A.8: Process Administrator for a workflow

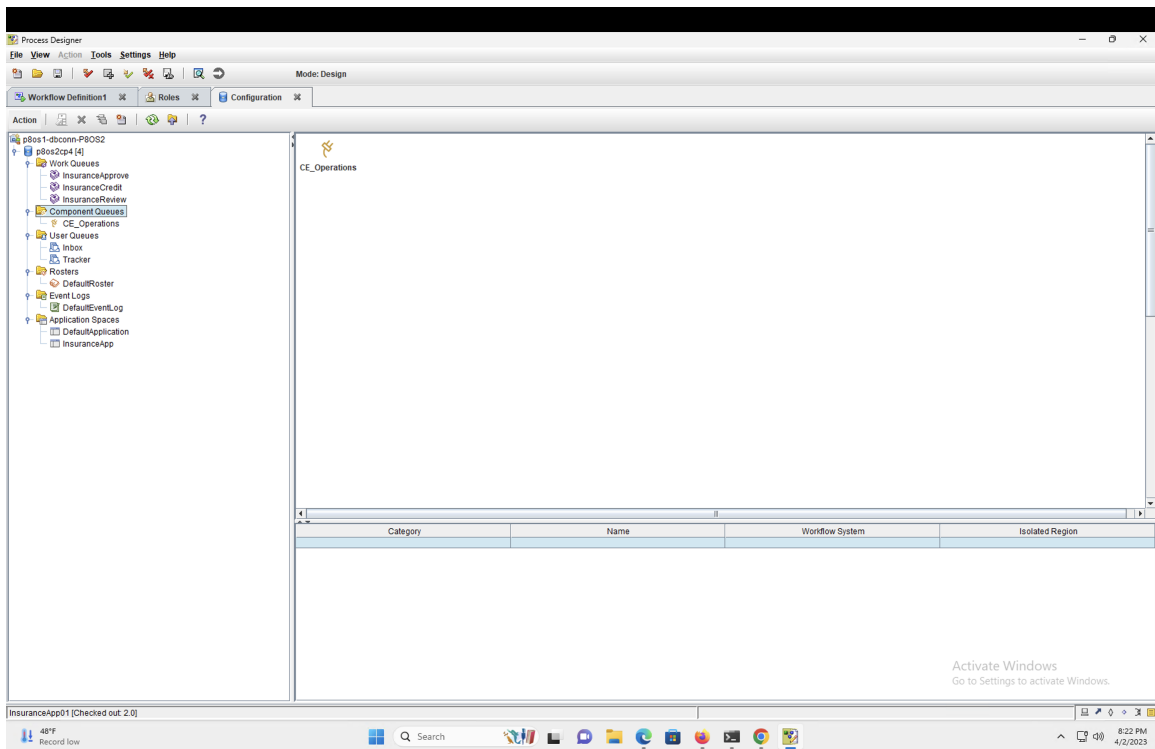


Figure A.9: Roles and Work Queue in Process Designer

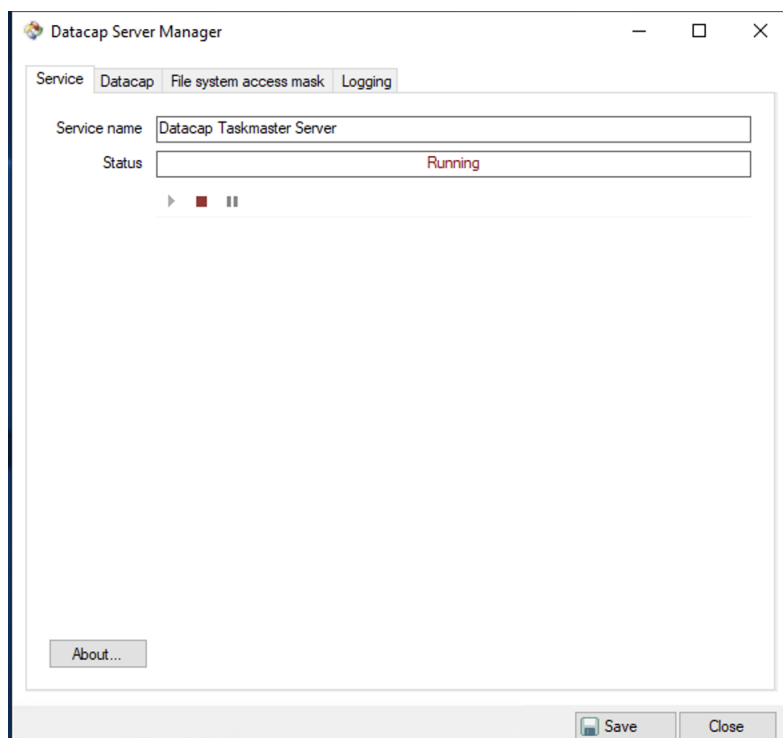


Figure A.10: Datacap Server Manager Console

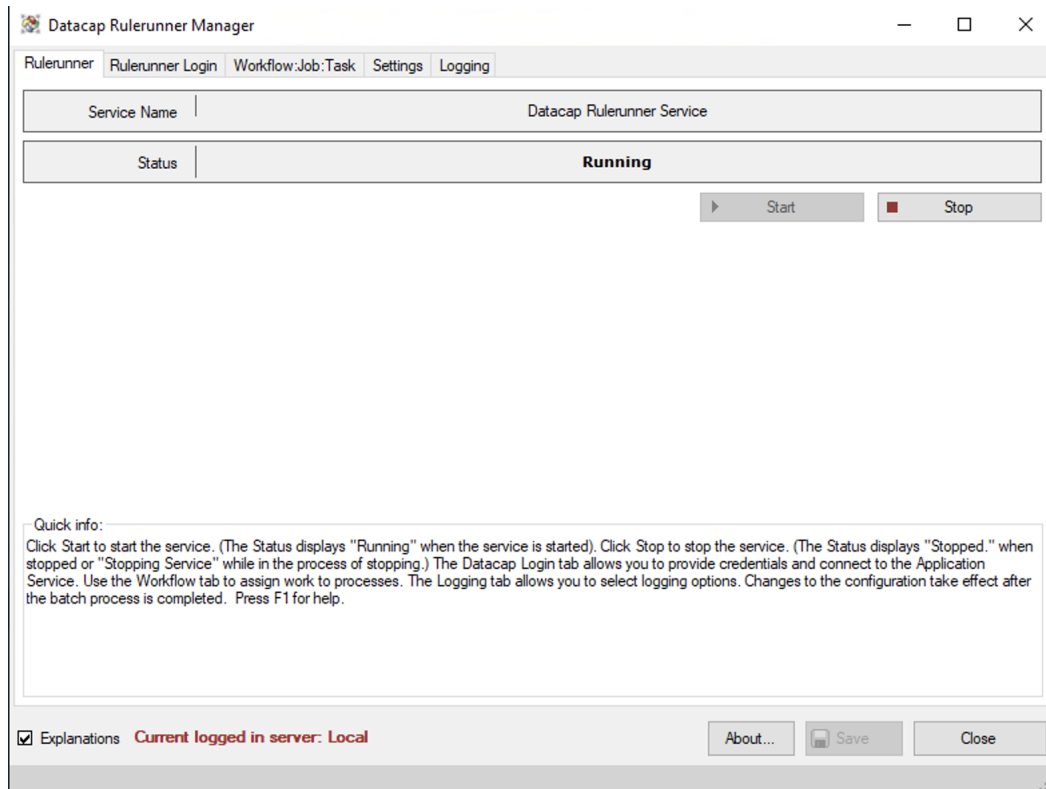


Figure A.11: Datacap RuleRunner

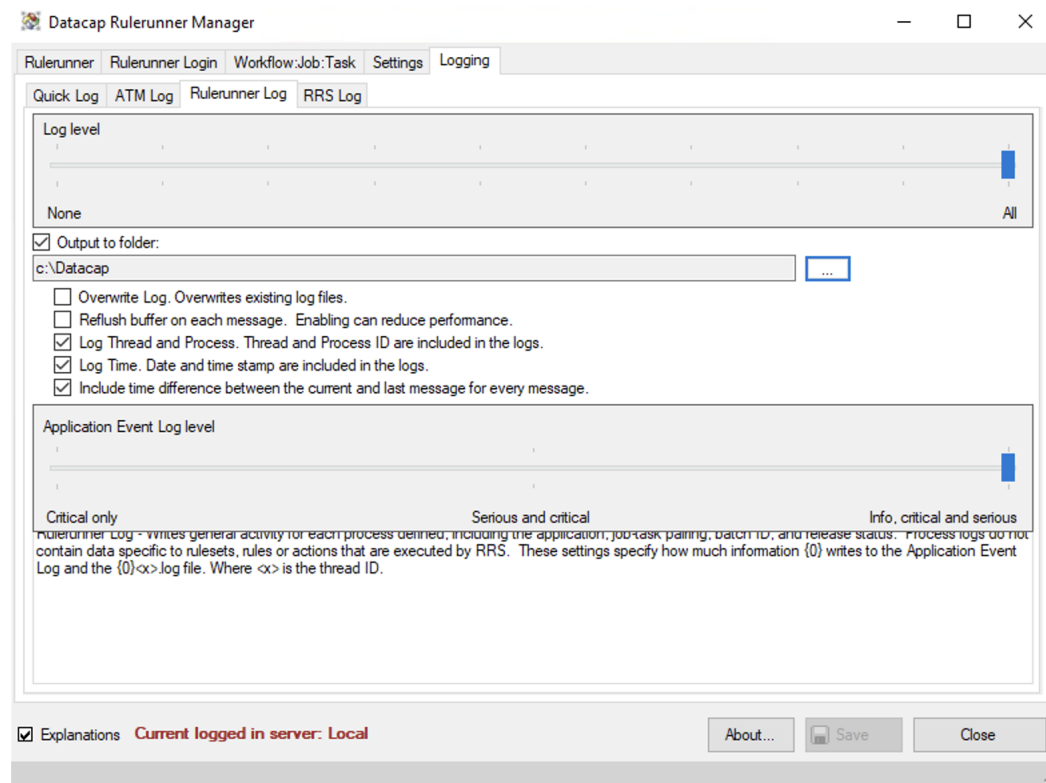


Figure A.12: Logging in Datacap