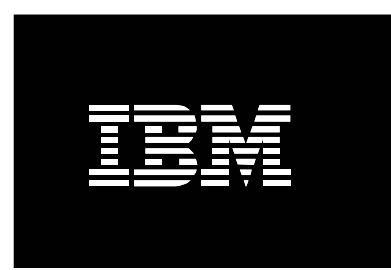


Whitepaper for IBM FileNet P8
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IBM FileNet P8: Enterprise Reference Architecture Overview & Services Descriptions

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Executive Summary

An *enterprise reference architecture* (ERA) is a framework or blueprint for designing information technology. It defines a set of building blocks and shows how they fit together, providing a common vocabulary and conceptual framework for information technology environments. IT organizations are increasingly using enterprise reference architectures as mechanisms for defining the key services that their IT environments should deliver, and for providing guidelines for IT planning and technology selection and implementation.

IBM FileNet has developed a unified enterprise reference architecture for enterprise content management (ECM) and business process management (BPM). The purpose of this reference architecture is to:

- Highlight the inseparable nature of ECM and BPM
- Describe the superiority of IBM FileNet's technology vision and architectural approach
- Conceptualize a solution involving IBM FileNet and identify common integration points with common enterprise technology

This document provides an overview of the ERA, and a description of the key services that are part of IBM FileNet's ERA definition.

Overview of IBM FileNet P8 Platform: Enterprise Reference Architecture Definition

IBM FileNet has developed a visual depiction of its ECM/BPM reference architecture framework. This framework includes a number of "layers" that deliver key capabilities or services to support ECM and BPM applications for organizations. The architecture framework includes the following core service layers:

- **Input, Presentation and Output Services.** These services are leveraged to acquire and ingest content through a variety of input and capture devices and software, generate consistent, well-formed data that can be used directly by another system or displayed through an out-of-the-box or custom user interface to a person, and printed onto a variety of output devices. Examples include capture products, portals, Web clients, and WebDAV (Web-based Distributed Authoring

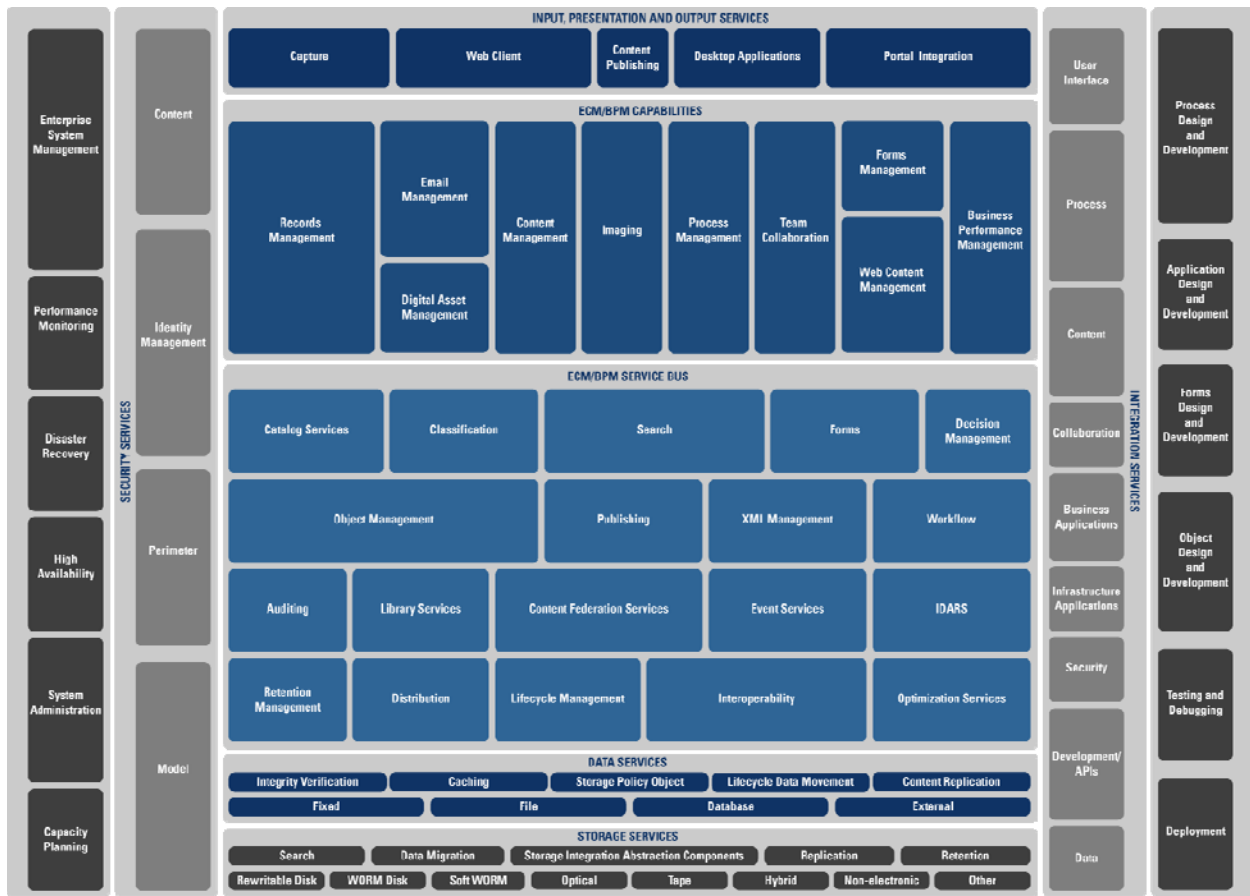
and Versioning) enabled applications.

- **ECM and BPM Capabilities.** These are high value business-oriented services that directly leverage the lower level services of the ECM/BPM Service Bus. These services are unique and make it easy for content- and process-driven applications to leverage the full scope of functionality in the end-to-end IBM FileNet P8 architecture.
- **ECM/BPM Service Bus.** The services that reside in the ECM/BPM bus represent low-level functionality specifically designed to enable content- and process-driven applications. The services can be used to compose more complex composite applications that require significantly less effort than building them from scratch.
- **Data Services.** The services in this architectural layer are designed to allow insert, extract, and re-use of data from the enterprise data stores and applications. The layers isolate data consumers from the underlying data constructs and changes. These services provide access to both structured and unstructured data stores and repositories.
- **Storage Services.** These services provide interfaces to physical and virtual storage sub-systems, data management components, and content caching services and are a key component of Information Lifecycle Management (ILM). They abstract out the different capabilities provided by different storage vendors into a coherent model.

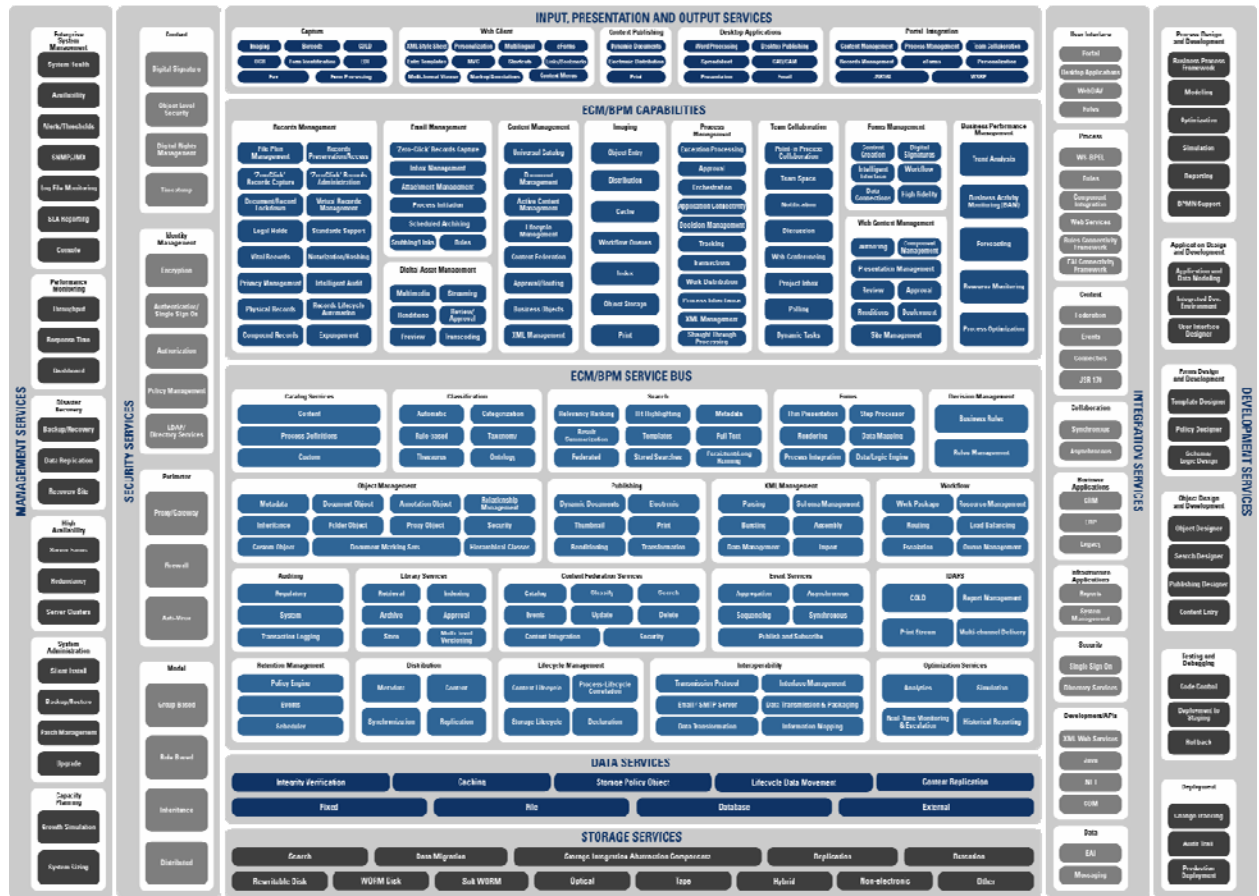
In addition, the ERA definition is surrounded by other layers that are not necessarily core ECM or BPM services, but provide critical and required functionality for enterprise applications. These complementary layers include:

- **Management Services.** These services are used to provide end-to-end system and process management.
- **Security Services.** These are comprehensive services for managing the security of data within an organization, as well as data transmitted and received within or outside of the organization.
- **Integration Services.** These services help integrate system components like user interfaces, data, storage systems, processes, etc.
- **Development Services.** These services are designed to enhance and support the development process.

The following figure shows the ECM/BPM reference architecture framework at the highest level.



The following figure shows the ECM/BPM reference architecture framework at a more detailed level.



The sections that follow provide more detailed descriptions of the various layers and services depicted in the figures above.

ECM- and BPM-Specific Layers

This section highlights the ECM- and BPM-specific layers and services in IBM FileNet's ERA definition. The primary layers are:

- Input and Presentation Services
- ECM and BPM Capabilities
- ECM/BPM Service Bus
- Data Services
- Storage Services

Input, Presentation, and Output Services

Capture

Provides services around the acquisition, image enhancement, indexing, Optical Character Recognition (OCR), and distribution of content such as paper documents, faxes, word processing files, spreadsheets and CAD files.

Service	Description
Imaging	Bring in content via an image scanning mechanism, either a custom or a vendor solution.
OCR	Recognize characters in scanned documents. The services must provide both whole document and zoned document recognition services, including integration with index field value domains (a zip code will be 5 + 4, for example).
Fax	Direct capture of electronic facsimile transmissions. The capture should include the parsing and capture of fax related metadata that is sent during transmission.
Barcode	Encoding of characters that are machine readable. Rectangular black bars and the white space between the bars form characters as defined for specific bar code types. Bar code types include 3 of 9, Interleaved 2 of 5, UPC and others. Bar codes are typically used to encode index data and/or separate documents.
Form Identification	Recognition of pre-defined forms when re-scanned into the system. Provides a way to identify the images that correspond to one or more specific forms for automatic matching and processing.
Form Processing	Provides capabilities for the capture and recognition of fixed format forms, using a template to identify, extract and validate data from scanned images for input to business process applications.
COLD	Provides a system for indexing, sorting, storing, mining and analysis of computer generated reports and forms such as customer statements, claims, billing statements, and payroll histories in a compressed but easily retrievable format. This system makes it unnecessary to archive reports in printed form and is easier to work with than microfiche, an earlier solution.
EDI	Electronic Data Interchange-the transfer of data between different companies using a standard format. ANSI has approved a set of EDI standards known as the X12 standards. IBM FileNet Capture Partners provide a way to output Captured information in EDI format for use with other business systems.

Web Client

IBM FileNet's Web client is Workplace, a J2EE application that provides services to allow end users, business analysts, and administrators access to IBM FileNet P8 content and process management functionality from any Web browser. Workplace speeds deployment through an extensive array of site and user preferences. Standards-based customization through XML style sheets allows for easy tailoring to meet the corporate look and feel of any organization. It comes in a variety of languages with a multi-format image viewer. Content entry, publishing, and search templates can be utilized to

maximize end user productivity. Context driven menus, bookmarks, shortcuts, and portal-like views minimize the need for end user training.

Service	Description
XML Style Sheet	Standards-based services for the creation and management of style sheets for tailoring the look and feel of the Workplace UI to meet corporate branding requirements.
Entry Templates	<p>Provide end users with a fast, customizable and easy way to add documents, custom objects, and folders to P8 repositories. Entry templates allows the individual to create object wizards to be customized to a particular purpose such as 'Create Invoice' and only the relevant data for an invoice will be entered.</p> <p>Besides Entry Templates, other templates include:</p> <ul style="list-style-type: none">• Publish Templates that contain rules for publishing and republishing source documents.• Search Templates for creating and maintaining search criteria.• Security Template for creating and maintaining the security setting for a document in the object store.

Multi-format Viewer	Multi-format Image Viewer enables the display and markup of a variety of common image formats and their annotations visually including BPM, COLD, JPEG, TIFF.
Personalization	Provides site and user preferences to enable system administrators and end users to personalize the information and layout of Workplace to meet their needs.
MVC	<p>Model-View-Controller (MVC) architecture is usually associated with a Java™ 2 Platform, Enterprise Edition (J2EE™) application.</p> <p>Applications must be implemented in a way that allows the enterprise to adapt to Model (application) changes, View (presentation) changes or Controller (interaction) changes. IBM FileNet provides an MVC framework that allows enterprises the flexibility to adapt to new and changing requirements. Your enterprise can grow freely based on your business, not the implementation technology.</p>
Markup/Annotations	Annotations can be added to an image document to call attention to areas of the graphic, to apply a stamp of approval, or to add text notes.
Multilingual	The ability to use the client browser locale to display UI elements according to the end user's language.
Shortcuts	A method for quickly locating frequently used pages. End users can save their favorite categories and folders to allow them to directly access them. System administrators can also save Site Shortcuts to enable all users to access them directly.
eForms	Electronic forms (eforms) that can be created and saved to the IBM FileNet Content Engine. Typically, these forms automate processes and data collection. The output can then be saved as an artifact for compliance including any digital signatures and encryption. The form author can configure fields to use a variety of intelligence features, including calculations, error checking, lookups, choice lists, and other features that make data entry fast and accurate. A form template can also be linked to services or systems used in your organization. For example, a form can link to a database so completed forms can be submitted electronically and signed using digital signatures.
Links/Bookmarks	Another method for quickly locating frequently used pages besides Shortcuts. Bookmarks are a feature of the Web browser for storing frequently visited Web pages. Bookmarks can be established to documents, folders, custom objects, search templates and stored searches.
Context Menus	A menu that only contains the list of tasks or choices specific to the item selected.

Content Publishing

Provides services to assist in the assembly, preparation, renditioning, formatting and delivery of content in a number of common output formats both analog and digital.

Service	Description
Dynamic Documents	Create documents that have variable content. This content can be hidden or surfaced based on variables, events, or data. This allows the documents to adapt to a particular context and act intelligently. For example, in a loan generation application, creating a loan document based on a complex set of rules for a particular customer that consists of many separate documents authored throughout the enterprise. Another example of a dynamic document is a compound document.
Electronic Distribution	Delivery of content to external sites; for example, content created within the enterprise intended for syndication, as well as copyright-controlled items requiring digital rights management services. For example, this can be based on events, processes, or express actions.
Print	Print production of content and documents. These services should provide the ability to print to a number of standard print standards and to dynamically insert content during print runs. The print job can also be created on demand based on user events such as joining a mutual fund, which prints a prospectus for the customer.

Desktop Applications

Provides services around the creation and modification of content in third-party desktop applications including Microsoft Office and Lotus Notes and storing them in an IBM FileNet P8 repository. Content includes email, spreadsheets, rich text documents, CAD files, presentations, video, and images.

Service	Description
Word Processing	Provide integration into Microsoft Word and popular word processing applications to enable users to easily manage documents within an IBM FileNet P8 repository. Users can easily store, search, and retrieve documents directly from the Microsoft Word menus.
Spreadsheet	Provide integration into Microsoft Excel and popular spreadsheet applications to enable users to easily manage spreadsheets within an IBM FileNet P8 repository. Users can easily store, search, and retrieve spreadsheets directly from the Microsoft Excel menus.
Presentation	Provide integration into Microsoft PowerPoint and popular presentation software to enable users to easily manage presentations within an IBM FileNet P8 repository. Users can easily store, search, and retrieve

	presentations directly from the Microsoft PowerPoint menus.
Desktop Publishing	Provide integration into popular desktop publishing applications.
CAD/CAM	Provide integration into popular computer aided design and modeling applications.
Email	Provide integration into Microsoft Outlook and Lotus Notes to enable users to easily manage, track and retain their email messages and attachments within an IBM FileNet P8 repository.

Portal Integration

Provides services to allow common ECM/BPM functionality to be accessed through standards-based portals. The portlets are standards compliant and extensible.

Service	Description
Content Management	Provide out-of-the-box content focused portlets that allow for interaction with a content repository. This functionality could include the ability to browse, search, author, and publish documents, folders or custom objects.
Records Management	Provide portlets that could include the ability to declare, search, manage, create a retention schedule, and expunge physical and electronic records.
JSR168	Java Specification Request (JSR) 168 is a J2EE standard that establishes a standard API for creating portlets, the integration component between applications and portals that enables delivery of an application through a portal. JSR 168 compliant portals should be able to access the common ECM/BPM functionality.
Process Management	Provide out-of-box process focused portlets that allow for user interaction with process flows. This functionality could include the ability to view a user's workflow inbox, view and participate in work queues, and track, complete and reassign work.
eForms	Provide portlets that could include the ability to author, edit, save, and search electronic forms.
WSRP	Provides services that adhere to the Web Services for Remote Portal, a standard for interactive, presentation-oriented Web services.
Team Collaboration	Provide portlets that could include the ability to create and manage collaboration groups and artifacts.
Personalization	Provide relevant content to end users based on their profile and/or preferences.

ECM and BPM Capabilities

Records Management

A comprehensive records management solution helps enforce compliance by automating and streamlining an organization’s records-based procedures. IBM FileNet’s Records Manager automates the entire records management lifecycle process and invisibly enforces consistent compliance and records management policy throughout the enterprise. IBM FileNet’s innovative ZeroClick technology is a revolutionary approach to records management policy enforcement providing automated records capture, classification, and administration and eliminating unnecessary end user participation in the processing of records.

Service	Description
File Plan Management	<p>A good file plan should be simple and provide structure, flexibility, and uniformity, essential components of a successful records management program. The purpose of the file plan is to make it easier to manage records information, and help meet statutory and regulatory requirements. A file plan provides a categorization structure – categories, sub-categories, folders and volumes – used to functionally classify, organize and secure records.</p> <p>Retention and disposition schedules are associated with the file plan categorization structure to control record lifecycle activities – how long the record is kept and what is done with it at the end of the retention period.</p>
'ZeroClick' Records Capture	<p>Automatically capture, declare and classify documents as records. IBM FileNet ZeroClick Records Capture eliminates time-consuming, burdensome and error-prone business-user steps. Users need little or no training because records are captured automatically.</p> <ul style="list-style-type: none"> • IBM FileNet ZeroClick—for Document Lifecycle Events <p>Automatically captures records from Microsoft Office applications or any document-centric application such as IBM FileNet Content Manager.</p> <ul style="list-style-type: none"> • IBM FileNet ZeroClick—for Business Process Management <p>Uses IBM FileNet BPM software to automatically capture records at predetermined milestones of your business processes.</p> <ul style="list-style-type: none"> • IBM FileNet ZeroClick—for Email Capture <p>Email messages and attachments that meet predetermined rules are automatically captured to IBM FileNet where they are precisely classified as records.</p> <ul style="list-style-type: none"> • IBM FileNet ZeroClick—for Bulk Records Import <p>Enables back-file capture of records from other content repositories.</p> <ul style="list-style-type: none"> • IBM FileNet ZeroClick—for Forms Capture

	Enables automatic capture of records from IBM FileNet eForms.
Document/Record Lockdown	<p>When documents are locked down as records, they have the following characteristics:</p> <ul style="list-style-type: none"> • Authenticity – It is what it says it is. • Reliability – It can be trusted as a full and accurate representation of the transactions or facts. • Integrity – It is complete and unaltered.
Legal Holds	<p>Advanced Hold Management provides the ability for a records administrator to suspend or stop the execution of disposition actions on records to ensure their availability beyond their approved retention period. Records under legal hold are protected from any possible destruction until the hold is lifted. Holds can apply to electronic and physical records.</p> <p>Examples of such situations can be a court case or an investigation when you cannot dispose records on schedule and temporarily need to extend their retention period.</p>
Vital Records	Manages essential records that are required for meeting your operational responsibilities during an emergency or disaster. IBM FileNet ZeroClick Vital Records Review automatically manages the periodic review cycle for essential records that are required for meeting your operational responsibilities during an emergency or disaster.
Privacy Management	<p>A centrally managed security policy is automatically applied to all records under management regardless of source, type or physical location. This ensures that records can only be accessed, viewed, printed, updated or deleted by an authorized user or process.</p> <p>Record Policies automatically inherit lifecycle and security policies from the record folder or volume into which they are filed.</p>
Physical Records	Paper records and other physical assets that have business value. Physical records are typically defined and stored by their location.
Compound Records	Enables a group of content elements to be treated as a single record. For example, an insurance claim may be comprised of multiple related documents that are linked to the claim and need to be managed as a single claim record.
Records Preservation/Access	Manage records that have been identified as having significant historical or business value and that warrant continued preservation beyond the time that is normally required for operational or legal purposes.
'ZeroClick' Records Administration	ZeroClick Records Administration consists of:

	<p>ZeroClick Bulk Records Import</p> <p>Automates the identification and conversion/capture of records from other business systems.</p> <p>ZeroClick Vital Records Review</p> <p>Automatically manages the periodic review cycle for essential records that are required for meeting your operational responsibilities during an emergency or disaster.</p> <p>ZeroClick Retention</p> <p>Automates the process of starting records retention by enabling retention events to be mapped to your business systems.</p> <p>ZeroClick Disposition</p> <p>Automates the process of starting records disposition by enabling disposition events to be mapped to your business systems.</p> <p>More than 60% of business records have their retention and/or disposition driven by an external event, such as "destroy three years after employee departure."</p>
Virtual Records Management	<p>IBM FileNet Records Manager supports the entire lifecycle of your records. With IBM FileNet Content Federation Services, organizations can access content from numerous repositories anywhere in the enterprise and federate this information to provide a single enterprise source for critical business content. Content and documents, including email messages, can be automatically declared as corporate records across multiple repositories and centrally managed to provide transparent enforcement of records management policies.</p>
Standards Support	<p>IBM FileNet Records Manager is fully certified against the criteria in the DoD 5015.2 Standard, including the requirements for managing classified records. Additionally, IBM FileNet Records Manager is designed to meet the requirements of other record keeping standards. Not all of these standards include a certification and testing program. These standards are: the 2002 Version of the UK National Archives Requirements for Electronic Records Management Systems; the Victorian Electronic Records Strategy (VERS) in Australia; the Model Requirements for the Management of Electronic Records (MOREQ) for the European Union; and the Document Management & Electronic Archiving (DOMEA) Standard for Germany. These aforementioned standards all focus on software functionality. There are other standards where IBM FileNet Records Manager may be used to support an overall Records Management Program such as the ISO 15489 for Records Management and the ANSI/ARMA 9-2204, Requirements for Managing Electronic Messages as Records.</p>
Notarization/Hashing	<p>External and verifiable means of independently validating the content and time integrity of any type of electronic asset.</p>
Intelligent Audit	<p>Complete Auditing enables record based user activities and actions to</p>

	<p>be tracked. Audit logs cannot be modified or deleted. Audit logs store information about:</p> <ul style="list-style-type: none"> • The action that has been performed. • The record on which the action is performed. • The user or application performing the action. • The date and time of the action.
Records Lifecycle Automation	<p>Reduces risk through enforced compliance by automatically and consistently capturing records according to records and information management (RIM) policy. The sheer volume of digital content — including email and new regulatory and compliance requirements means that process automation is vital for managing corporate records and to ensure proof of compliance with RIM policy.</p>
Expungement	<p>In case of electronic entities, both metadata and content will be automatically expunged in a manner that ensures the data is unrecoverable. For physical records, the metadata gets deleted in conjunction with the physical record. The entire process must be managed, tracked and audited.</p> <p>A record that is on hold cannot be deleted. A record that is marked as Permanent can be deleted.</p>

Email Management

A rule-based email management solution significantly simplifies the management of your corporate email, and is totally transparent to the end user. IBM FileNet Email Manager provides a fully automated and centralized email capture process. Messages and their attachments matching specific business rules are automatically indexed and archived in the IBM FileNet Content Engine. Important corporate emails can be retrieved when they are needed to address legal discovery requests, collaborative activities or regulatory requirements.

Service	Description
'ZeroClick' Records Capture	<p>Messages (and attachments) matching predetermined business rules are automatically indexed and archived in the IBM FileNet repository. Automatically classify and date stamp email messages as records so that they are easily retrievable for analysis or timely destruction, eliminating the need for a separate declaration step or event trigger.</p>
Inbox	<p>Automatically captures all email (or only email of corporate value) and</p>

Management	uploads it to a central repository where security is added and the messages indexed, thus reducing email storage administration and processing, properly capturing and managing the knowledge contained within the corporate email system.
Attachment Management	<p>Attachments included in the captured email can be handled in three different ways:</p> <ul style="list-style-type: none"> • The email can be left intact (with attachments embedded in the email), • The attachment can be left within the email while a copy of it is indexed and added to IBM FileNet as a separate object, or • The attachment can be separated completely from the email message and added to IBM FileNet with a shortcut/link left in its place.
Process Initiation	Automatically launch business processes in response to incoming emails. Link email correspondence to customer records within your CRM or ERP system, providing ready access to customer-related email content.
Scheduled Archiving	Enables email administrators to process existing email messages on a MS Exchange or Lotus Domino server and add them to an IBM FileNet repository. This feature is useful for on-time back-file conversion and the ongoing filtering of old email to remove it from the mail server once it has been archived in an IBM FileNet object store.
Stubbing/Links	Create shortcuts (links) in user mailboxes in place of captured messages and attachments allowing users to easily retrieve captured messages and related attachments while significantly reducing email system storage requirements.
Rules	Applies predetermined business rules at the server level to automatically assign the proper lifecycle criteria, determine the value of an email's content, enabling the automated enforcement of compliance with limited user interaction or user-related errors.

Digital Asset Management

A system that creates a centralized repository for digital files that allows the content to be archived, searched and retrieved. The digital content and metadata such as photo captions, article key words, advertiser names, contact names, file names or low-resolution thumbnail images are stored in repositories. Digital asset management also is known as enterprise digital asset management, media asset management or digital asset warehousing.

Service	Description
Multimedia	Enterprise content that is more dynamic in nature and typically involves larger file sizes and audio and video. Often referred to as digital assets or rich media content. This content can be intelligently added to the repository and the appropriate metadata extracted from the content. Additionally, business rules can run against the content creating renditions, thumbnails or other processes.
Renditions	The ability to generate alternate formats for a document or image (e.g., generate PDF for a Word document). This process may also include transcoding.
Preview	The ability to view the digital asset when searching, deploying, etc. Often involves reviewing a smaller format thumbnail rendition to avoid the overhead of retrieving the entire asset.
Streaming	Delivering rich media, typically audio and video, to the requesting user on demand as a consumable presentation rather than a file download.
Review/Approval	The act of reviewing and accepting rich media content prior to deployment. Often implemented using workflow.
Transcoding	Transcoding moves the content from one encoding system to another (MP3 to WMA; MP2 to MP4; MP4 to AVI; UTF8 to ISO8859-1; etc). Compressed-domain transcoding keeps the format the same but changes bitrate, size and other attributes of the format. Transcoding is often part of the renditioning process.

Content Management

A complete ECM solution for managing complex documents to gain active control over unstructured corporate assets. IBM FileNet Content Manager manages and controls the complete content lifecycle to improve efficiency and ensure compliance in content-related tasks such as publishing, expiration, and retention. It streamlines document management tasks by providing mature versioning and parent-child capabilities, robust approval workflows, and integrated publishing support.

Service	Description
Universal Catalog	A master catalog of all the documents and content under management regardless of where they reside, when they were created, how they

	were acquired and what applications can access them. Enterprise-class systems extend the catalog to include Content Federation. This includes a robust metadata model that captures all information and classification about the content.
Document Management	The ability to manage documents throughout the document lifecycle.
Active Content Management	The ability to have content be an active driver of process and task completion. Allows both fixed and dynamic content to be active participants in your business rather than passive overhead.
Lifecycle Management	The capability to actively control the full document and content lifecycle creation, consumption, editing, publishing, event consumption, retiring, and deleting all of your content while complying with records management policies.
Content Federation	Providing access, security and search capabilities for documents and content that reside in a mix of content repositories, including documents and content that resides in a foreign or legacy content store.
Approval/Routing	Process- or workflow-driven activity for reviewing documents or content. Best in class solutions combine approval/routing with active content capabilities.
Business Objects	Provides support for modeling both structured and unstructured business data as objects within the IBM FileNet P8 repository. Enables extremely powerful class and inheritance capabilities and includes full active content support.
XML Management	Provides the ability to manage XML as both structured and unstructured data. Also includes support for authoring, ingesting, publishing, and storing structured content. Combines the benefits of managing structured content with robust Enterprise class lifecycle management capabilities.

Imaging

A highly scalable solution for ingesting and managing large volumes of image content, IBM FileNet Image Manager is a highly scalable imaging solution that provides core imaging services: Cache, Batch Entry, Index, Document, Print, Storage Library, and Workflow Queues that can be geographically distributed for optimal performance.

Service	Description
Object Entry	Facilitates production-volume document scanning, assembly, and indexing. It uses tables to assist in tracking the status of scanned document batches.

Distribution	Multi-tier architecture that enables the geographic distribution of servers for optimal performance.
Cache	Robust, high-speed magnetic disk-based storage manager for recently accessed or soon-to-be-accessed documents.
Workflow Queues	Routing, tracking, scheduling and queuing service for workflow applications.
Index	Captures and store metadata to support searching for documents.
Security	Provides authentication and authorization capabilities for applications and other application services.
Object Storage	Manages all functions of the storage library. Implements a four-level hierarchical storage system capable of storing billions of objects that are often, but not necessarily, document images.
Print	Service to manage print and outbound fax. Printing can be done from desktop applications via native LAN or local print facilities.

Process Management

Business Process Management is a means of automating and optimizing traditionally manual business processes. The automation of business processes results in greater processing accuracy and significant productivity improvement, while simultaneously minimizing the cost per transaction. Once automated, the business processes can be further refined and optimized by using the modeling, simulation and analytics capabilities of IBM FileNet Business Process Manager.

Service	Description
Exception Processing	Provides the ability to automatically deal with problems in the process by escalating it to either a manual or automatic exception handling process.
Approval	Automates the approval process.
Orchestration	Enables integration and coordination of Web services operations across and beyond the organization. Provides the logic that ties XML Web services interfaces into end-to-end processes that may include and combine internal (front- and back-office) and external (partner/customer) processes. Web
Application Connectivity	Gather data directly from a third party application to facilitate decision making.
Decision Management	Employs business rules to enhance the decision making processes, which in turn facilitates straight through processing, more focused

	exception handling, and greater process agility.
Web Services	The ability to expose a business process as an XML Web Service, which in turn can be consumed as part of an Orchestration.
Transaction Support	Support transaction security, integrity and delivery of transactions.
Queue Management	Groups of users and automated processes are presented with a common area to choose/select work from.
Work Distribution	Deliver work in an optimized fashion to the system designated recipient.
Process Inheritance	Ability to leverage existing process definitions in a new business process. Important process related attributes do not need to be redefined in the new business process.
XML Management	The handling of XML documents used within a process. The interaction between the user and the XML document is handled in such a way as to minimize the requirement for the user to understand the underlying XML structure.
Straight Through Processing	The ability to minimize or eliminate human interaction from a business process thus minimizing cost per transaction while maximizing throughput.

Team Collaboration

A complete enterprise-wide team management solution that enables teams to exchange information, schedule and track tasks and meetings, and communicate in real time. IBM FileNet Team Collaboration Manager provides the contextual framework and collaboration tools, including ad-hoc tasks, discussion forums, live meetings, and interactive polls, to enable group members to share information and participate in processes to facilitate group decision-making.

Service	Description
Notification	Provide notification via email for various events such as new tasks, new polls, new discussion postings, new version of a document, and new folders.
Discussion	Discussions that can be organized in Forums and Topics with each posting against a topic that is managed as a document within the IBM FileNet Content Engine. Collaboration objects such as meeting, tasks, and documents can be linked to topics to provide additional context for the discussion.
Web Conferencing	Provide the ability to collaborate using real-time interactive electronic communication technologies such as WebEx that can be scheduled and recorded.

Project Inbox	Each project workspace has a unique email address for users to submit artifacts and exchange information and ideas via email.
Polling	Polls are a single question with multiple answers, closing date, priority, and assigned participants. Once the poll has been created, email notifications can be sent to assigned participants and other artifacts can be linked to the poll to provide additional context.
Dynamic Tasks	Capability for an end user to create and assign ad-hoc tasks to other team members. Tasks have properties such as name, description, assigned to, priority, due date, and reminder date. Once the task has been created, email notifications can be sent to assigned participants and other artifacts can be linked to the task to provide additional context.

Forms Management

Provides services to design, deploy and process intelligent electronic forms without programming.

Service	Description
Content Creation	Form templates, policies and data documents that are stored, maintained and versioned.
Intelligent Interface	HTML-based forms that are delivered to the user's Web browser. Calculations, lookups, data validation and formatting occur in real time in the browser while the user fills in the form.
Data Connections	Forms that connect to external data sources via JDBC or HTTP, providing pre-fill and lookup capabilities while the user fills in a form, reducing typing and data entry errors.
Digital Signatures	Form data can be digitally signed by the end user to ensure data integrity, user identification, and provide non-repudiation.
Workflow	Forms displayed to the user as the interface to a workflow step. Form data automatically mapped to workflow data fields enabling content-specific routing decisions.
High Fidelity	Forms designed to appear in the user's browser exactly as they do on paper. They can also be rendered to high quality static image formats such PDF or TIFF for printing or archival.

Web Content Management

A complete solution for the creation, approval, and publication of Web content. IBM FileNet Web Content Manager streamlines the management of Web assets and publishing cycles across multiple Web sites while enforcing desired look and feel standards. It also enables business users to publish information quickly while giving Webmasters the necessary control to create, deploy, and administer Web sites.

Service	Description
Authoring	Act of creating or updating Web content. Historically completed by highly technical Web specialists, new ECM capabilities allow non-technical business users to author.
Presentation Management	The look-and-feel formatting that defines how content elements are displayed to end users. Includes the location of headers and footers, link placement, and location and sizing of graphic elements.
Review	Process or workflow driven activity of reviewing new and revised content prior to being deployed to a production environment. Typically includes both content and look-and-feel reviews.
Renditions	The ability to convert a document or content item from its original format to a universal format such as HTML, XML, or PDF.
Site Management	Ability to manage one or more Websites and all of its contents and allow the business to version the Website in its entirety.
Component Management	Content objects that have Web use or are components in a Web page or site. New ECM capabilities allow for Web content to be object based and for better overall separation of page layout from content to promote content reuse.
Approval	The act of accepting the Web content that has been reviewed and moving content to the deployment step. Approvals are part of workflows
Deployment	Process of moving approved production content from a staging environment to a live production Web server or portal environment where Web content can be deliver to, or consumed by, the desired end users.

Business Performance Management

Business Performance Management is the ability to monitor and control the operational control of the business processes under management.

Service	Description
Trend Analysis	The ability to identify trends by reviewing the variation of key performance indicators presented in a business user-orientated dashboard format.
Business Activity Monitoring (BAM)	The presentation of personalized real-time process performance data to business users via an interactive dashboard.
Forecasting	The presentation of the results from simulated process scenarios via an interactive dashboard.
Resource Monitoring	The ability monitor the productivity of the various resources deployed to process tasks in processes under management. This would include: <ul style="list-style-type: none">• Volume of work processed• Nature of work processed• Task work time• Task cycle time
Process Optimization	Ensuring the desired level of process performance is maintained by either notifying users or executing predefined action if performance drifts outside desired performance level.

ECM/BPM Service Bus

Catalog Services

Provides services for having an enterprise/master catalog of all the documents, content of all types, metadata and process definitions in the enterprise across all repositories.

Service	Description
Content	Ability to index a variety of content types – document, image, PDF, Web content, email, electronic and paper records and their associated metadata
Process Definitions	Ability to index the process definitions and their associated metadata
Custom	Ability to index custom objects and their associated metadata – customer records, for example

Object Management

Provides services for managing enterprise content and a broad range of unstructured and structured data known as business objects including electronic documents, Web content, records, folders, workflow definitions, stored searches, templates, reports, and simulation scenarios.

Service	Description
Metadata	Collection of properties that describe the content / object.
Inheritance	A subclass / child that gains the attributes of its parent / master class including properties and security attributes.
Custom Object	Predefined base class that is provided by the IBM FileNet Content Engine for managing and storing data that does not have content or a lifecycle. For example, a customer might be represented in the repository as a custom object.
Document Object	Predefined base class that is provided by the IBM FileNet Content Engine for managing and storing documents and their associated metadata. Documents are managed throughout their lifecycle and can participate in compound document structures.
Folder Object	Predefined base class that is provided by the IBM FileNet Content Engine for managing and storing folders and their associated metadata. A folder is a container that is used to group other objects (e.g., documents or other folders).
Document Marking Sets	A powerful feature that offers the ability to secure content based on the value of one of its properties. Markings offer additional security on an object based on selected values. Each marking has an associated list

	<p>of users, each of whom has access rights to the object. Users not explicitly given access through the marking are denied access to the object. Markings do not override the normal security on the object, but work with it to provide an additional security layer. Document marking sets are heavily used in IBM FileNet Records Manager.</p>
Annotation Object	<p>Predefined base class that is provided by the IBM FileNet Content Engine for representing incidental information that is attached to an object for the purpose of annotating or footnoting that object.</p>
Proxy Object	<p>An IBM FileNet Content Engine document that references content that resides in another repository.</p>
Relationship Management	<p>Relationship management is the ability to create, manage, traverse and remove relationships between two objects in the repository. Additional behavior such as prevent deletion of child, and delete child when parent is deleted can be expressed through Relationships.</p> <p>The relationships are discoverable and extensible to include metadata. Also the relationships form the basis of the compound document model.</p> <p>For example, a relationship between a Word document (parent) and PDF (child) document is created when the document is renditioned to PDF.</p>
Security	<p>Defines the default access rights for the object and security policies that may be applied to the object.</p>
Hierarchical Classes	<p>Classes define the types of objects stored in the repository. Classes define the metadata, default security, audit configuration and business logic associated with objects. Predefined base classes can be subclassed to define new object types, where behavior is inherited from the parent to the child class.</p>

Auditing

Provides services to log data pertinent in order to later examine activity for either regulatory or management reasons.

Service	Description
Regulatory	Log and access audit data for the purposes of regulatory compliance.
System	Log and access audit data related to system activity and performance for the purposes of system management and performance improvement.
Transaction Logging	Monitor content and process management activities such as object creation, update, deletion, date/time of activity, and user of activity that are logged and can be provided as management reports.

Retention Management

Provides services for the management of retention and disposition schedules as they relate to the management of records.

Physical storage is managed in the Data Services layer.

Service	Description
Policy Engine	Provides runtime services to manage retention policy rules and to take appropriate action and/or generate events based on these rules.
Events	Ability to manage common retention-related tasks based on scheduled events.
Scheduler	Schedule common retention-related tasks based on events or dates.

Classification

Provides services to assist in classifying or categorizing new and existing information and to add relevant metadata to content for efficient organization and delivery of content to portals and desktops. It involves the development of taxonomy structures, categorization of content, presentation design and content delivery, and the ongoing monitoring and maintenance of knowledge assets.

Service	Description
Automatic	Automatically classify documents of specific content types to a document class without user intervention. This technology commonly leverages parsing, filters and related technology to optimize the results.
Rule-based	A means to efficiently and accurately organize content. Business rules allow an organization to leverage their domain expertise to construct a

	hierarchy of categories. The characteristics of each category can be specified using rules.
Thesaurus	Access to word stemming and synonym data to assist in the process of content categorization to group items using similar words.
Categorization	Another word for classification. Individual documents or content components are analyzed for subject matter and meaning and then assigned to the "best fit" category in the taxonomy. For example, in the library, this is analogous to assigning Dewey Decimal numbers to individual library books.
Taxonomy	Defines a set of categories that documents are classified against. A taxonomy is often industry specific.
Ontology	An explicit formal specification of how to represent the objects, concepts and other entities that are assumed to exist in some area of interest and the relationships that exist among them. This is the system (world view/paradigm) that includes the taxonomy, the objects, and the relationships between the objects.

Library Services

Provides services that support check-in, check-out, and other multi-user management functions critical to content and process management.

Service	Description
Retrieval	Retrieve documents from the content repository. The documents may be verified for integrity before retrieval.
Archive	Move documents from near-term content repositories to longer-term information archives.
Store	Save documents to the content repository.
Indexing	Provides a service for full-text indexing of content and metadata for enabling users to easily search the repository.
Approval	Pre-defined approval workflows for enabling users to easily enter new or modified content into the repository and have that content reviewed. New approval workflows can be created as desired.
Multi-level Versioning	Provides two-level version management, where interim versions can be created and managed prior to check-in and distribution of major versions.

Distribution

Provides services to manage the process of data and content distribution to improve performance, service levels, redundancy, and offline usage.

Service	Description
Metadata	Synchronize and/or replicate content properties across geographic locations so it's available to users globally for optimal performance.
Synchronization	Provides services to allow content to be synchronized between a server and client in order to allow the client to operate in an offline mode.
Content	Synchronize and/or replicate content across geographic locations so it's available to users globally for optimal performance.
Replication	Provides services to manage more than one repository that houses replicated content. These services help synchronize content, metadata, and state between these repositories and keep them synchronized.

Search

Provides services oriented around the search functions in an enterprise, such as indexed search, full-text search, and federated search.

Service	Description
Relevancy Ranking	Rank search results using algorithms that check for highest correlation with the initial search query.
Result Summarization	Present document summary in the search results to help end-users quickly identify the most relevant hits in a results list without downloading and reading an entire file. Intelligent summaries can be created to show the context in which the query terms appear in the document.
Federated	Provides searching capability across multiple disparate sources of unstructured data, leveraging the federated repository services as necessary. Correlates multiple answer sets into one answer set for the end user.
Hit Highlighting	Allows users to immediately find the first instance of a word in the document they are searching for, no matter if that word is on the first page, last page, or somewhere in between.
Templates	A Search Template can be defined for common searches done by

	many end users to save time and increase productivity.
Stored Searches	A complete search that is ready to be used for searching the repository. It can include criteria based upon contents and/or property values.
Metadata	Ability to search for documents and content based on metadata or properties associated with the document.
Full Text	Ability to search for documents based on a keyword or text phrase within the document itself.
Persistence / Long Running	Ability to perform a single search across multiple content repositories / databases that could take many hours or days to complete. These searches are persisted in the repository for access at a later point. This is important for e-discovery.

Publishing

Provides services to convert documents from a variety of formats, such as Microsoft Word, Excel, and PowerPoint formats to PDF and HTML formats.

Service	Description
Dynamic Document	Document that is automatically rendered into another format. These documents contain more than one document, often of more than one file format. The dynamic document can be XML and consist of hundreds, if not thousands, of documents.
Thumbnails	A miniature graphic of a page.
Renditioning	Transformation of a source document's format to a target format (e.g. Word to PDF) where the content stays the same, but the format is changed.
Electronic	Documents managed as electronic files as opposed to a physical format.
Print	Electronic document that is printed in real-time or in batch.
Transformation	Ability to change the style/format of a document from one format (e.g., Word) to another (e.g., PDF) while retaining the content of the document.

Content Federation Services

Provides services to access content from numerous heterogeneous repositories within the enterprise and federate the information to provide a single enterprise source for critical business content. IBM FileNet Content Federation Services allows enterprises to search, catalog, classify, secure, retain, comply, activate, update and delete content residing in repositories across the enterprise.

Service	Description
Catalog	Ability to create and manage a master index of content and documents that reside in a number of heterogeneous repositories (similar to a card catalog in a library). The index data would include document properties.
Events	Enables active content capabilities on documents that have been federated from disparate repositories.
Content Integration	Providing access, security and search capabilities for documents and content that reside in a mix of content repositories, including documents and content that resides in one or more repositories.
Classify	Ability to assign metadata to a document regardless of where the document resides.
Update	Ability to modify the metadata (document properties), document content, and/or location of the document regardless of where the document resides.
Security	Ability to set and/or modify the security permissions and policies on the document and its metadata regardless of where the document resides.
Search	Provides integrated index- or full text- based search results against multiple content stores including documents and content that resides in one or more repositories.
Delete	Ability to delete the document and its associated metadata regardless of where the document resides.

Lifecycle Management

Provides services for the full content lifecycle from creation to expungement.

Service	Description
Content Lifecycle	A graph of states that a document will go through over its lifetime as well as actions that are triggered when it transitions from one state to another.
Storage Lifecycle	Ability for fixed and dynamic content to be stored on a storage system based on its retention schedule.

Process-Lifecycle Correlation	Ability for a document at a particular state to launch or participate in a workflow.
Declaration	Indicating that a document transitions into a record at some point in its lifecycle.

Forms

Provides services to manage electronic and print forms including both the form itself and the data that it can contain.

Service	Description
Thin Presentation	Form templates and their associated logic are converted to pure HTML and client-side JavaScript for display in an end user's Web browser. Upon completion, form data is delivered back to the server for storage and processing.
Rendering	Form templates and data can be programmatically rendered into various static image formats such as PDF and TIFF for archival purposes.
Process Integration	Forms and form data can be integrated with workflow steps providing direct display of form content and automatic mapping of form data with workflow data fields.
Step Processor	Out-of-the-box eForms step processor displays form content directly to the user, simplifying the interface and the steps required to complete or approve forms. No custom programming is required since the eForms step processor can display multi-page form templates created with the easy to use eForms Designer application.
Data Mapping	Data entered into a form can be automatically mapped into form data document properties and workflow data fields for further use. Users do not need to manually re-enter information.
Data/Logic Engine	Form templates can be designed with extensive data logic similar to that provided by spreadsheet applications. This logic is converted to client-side JavaScript and executes within the user's browser, providing real-time results.

XML Management

Provides services to manipulate and work with XML data including the ability to parse through the data, burst a large XML file into smaller components, and to use XML to represent any data.

Service	Description
Parsing	Provides services to analyze and/or separate XML data into more easily processed components.
Bursting	Provides high performance services to take an XML file (usually a large one) and break it down into several to many atomic XML files. During this process, metadata can be extracted from the XML and relationships established between the atomic elements.
Data Representation	Use of XML to represent data, including workflow definitions, templates, publishing assemblies, import/export formats, and site/user preferences, etc.
Schema Management	Data model and style sheet definitions (XSL) that are represented using XML. XML can be validated against the specified schema on import.
Assembly	An XML document that defines the assembly or list of source documents and the order in which the documents would be combined into a single document. This is based on the compound document framework and turns a compound document into a single XML document reversing the process of bursting.
Import	XML is used to import and export objects and metadata definitions.

Event Services

Provides event services, allowing all components to react to stimuli from systems, applications, and people, whether by pre-determined or ad-hoc events. Assuming each component has some mechanism to create events, this layer provides access to publish and subscribe to events; real-time processing; event logging; event correlation, mapping one event to another to provide a more meaningful communication; event sequencing, providing order to events which may not happen in sequence; and event aggregation to make decisions based on the aggregation of events rather than a single event.

Service	Description
Aggregation	Aggregate events over the course of time (could be within milliseconds or over the course of years). These services should address the problem with high efficiency (e.g., don't keep events that may occur over the course of months in memory, store them to disk).
Sequencing	Take messages that arrive out of order and re-order them as needed

	prior to further processing.
Publish and Subscribe	Publish and Subscribe is an effective way of disseminating information to multiple users. It provides a source of information that users select from and then receive on a regular basis or when certain events occur.
Asynchronous	Behavior encoded in the event subscription occurs after the action that triggered the event.
Synchronous	Behavior encoded in the event subscription must occur in conjunction with the action that triggered the event. These events are capable of affecting transactions and prohibiting actions that violate business policies.

Interoperability

Provide services to make inter- or intra-system communication seamless with other systems of record in the enterprise. This includes interaction with systems outside of the enterprise as well.

Service	Description
Transmission Protocol	Provide abstraction from underlying transmission protocols for information exchange.
Email / SMTP Server	Simple Mail Transfer Protocol (SMTP), a protocol for sending email messages between servers.
Data Transformation	Mapping of one data format to another.
Interface Management	Ability to transform or manage data between different protocols or APIs.
Data Transmission & Packaging	A network of computer systems linked together for communication across LAN, WAN, and other types of networks.
Information Mapping	Mapping of one data format to another.

Decision Management

Provides services to manage and leverage rules throughout content- and process-driven applications.

Service	Description
Business Rules	The definition and implementation of rules within the content and process lifecycles. Typically, the rules are leveraged by services within document events and enterprise workflows to make automated decisions to streamline the flow of information or application execution.
Rules Management	Maintain, update, and manage rules used by the rules engine runtime.

Workflow

Provides services to enable and manipulate human driven process flows.

Service	Description
Work Package	Provides services for the management of the work packages that flow through the BPM system, as noted in the subcategories.
Routing	Provides services for the management of routing components, data, and other content through the workflow, using defined process maps and definitions to execute the process engine.
Escalation	Provides services for initiating an escalation path during a process execution.
Resource Management	Provides services for assignment of resources to a process step based on rules that act upon the process execution at run time.
Load Balancing	Provides services for workload balancing among executing tasks in the process engine.
Queue Management	Provides workload balancing services for work queues across individuals or groups.

IDARS

Integrated Document Archive and Retrieval System. This is a Gartner Inc. specific term, and they define it as a system for "storage access, management, distribution and viewing of static data, which includes images and print-stream-originated reports." IDARS covers a broader range of archiving to distribution capabilities to multiple devices for static data thus subsuming COLD and Distributed Output Mgmt (DOM). A key Gartner Planning Assumption is that by 2007, IDARS will cease to be a stand-alone market and will become an integral component of an ECM suite (0.7 probability).

(Gartner Inc., March 2005 "Magic Quadrant for Integrated Document Archive and Retrieval Systems, 2005")

Service	Description
COLD	Computer Output to Laser Disc: An archive-centric model for managing static data directly for storage purposes to laser disc. Products solely focused here lack capabilities for broader output management.
Print Stream	Also known as output management for managing a variety of printer output formats and streamlining the delivery of documents. These documents can be generated in batch or on-demand based on some user or process event.
Report Management	This is a newer, replacement term for COLD.

Multi-channel Delivery	A common term used to describe pushing information of all types to various output devices including, paper, Web, PDA, fax machines, printers, etc. Think of channel in this respect as a communication path. This is often critical for bill presentment and payment in which paper statements are required and often companies send email or Web-based statements in conjunction with paper.
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Optimization Services

Provides functionality required to ensure the optimal alignment between deployed processes and the current business environment.

Service	Description
Analytics	Multi-dimensional performance data, including custom business data fields, facilitating detailed real-time and historical analysis of process performance.
Real-Time Monitoring & Escalation	The continuous tracking of work flowing through the processes under management coupled with autonomous escalation as, and when, exceptions arise.
Simulation	The simulation of the performance of processes prior to their deployment, providing quantitative information regarding the performance improvements.
Historical Reporting	Comprehensive historical data, providing both a micro- and macroscopic view into the performance of the tasks making up the processes under management.

Data Services

Provides the services to write, read, and re-use data in enterprise data stores and applications (both structured and unstructured content). The layers isolate data consumers from the underlying data object constructs and changes, and integrate between the layers above and the Storage Services layer below.

Integrity Verification

Repository and data storage and transfer mechanisms employ algorithms to verify the content stored and the content retrieved is correct. This prevents transmission errors, storage corruption, and tampering of the stored content. Prominent examples include checksumming and hashing functions to verify document and data integrity and immutability. Checksum comparisons are commonly used in IBM FileNet P8 to ensure that IBM FileNet-managed documents and other objects have remained unchanged through network and I/O transfers, or in content catalog entries to prevent the referenced object from being replaced or altered and undetected.

Fixed

Fixed Content Device leverages services and capabilities defined within and above the Data Services layer to access and manage content in a Fixed Content Device, such as EMC Centera, and NetApp SnapLock, as well as IBM FileNet Image Services and its own supported storage methodologies and devices.

Caching

Provides services to cache commonly accessed data to enhance the performance of the overall system, or data accessed by local users. Typically, the Cache will reside on a storage device with higher performance than the main storage device.

File

Leverages services and capabilities defined within and above the Data Services layer to access and manage content in an IBM FileNet P8 File Store.

Storage Policy Object

The Storage Policy Object enables the association of defined document classes (e.g., Broker Transactions Atlanta 2005, Property Claims Forms – Household, Video testimonials, Expired Contracts) with pre-determined Storage Policies (fast, transactional storage, archival storage, mandatory WORM storage) – which can then be associated with, and moved between Storage Areas. Storage Areas include enterprise SAN storage, NAS, NetApp SnapLock WORM Disk, and even optical storage. These are commonly accessed through the general File or Fixed Content Store Data Services below.

Database

Provides services to access and manage content or metadata stored in a relational or object database.

Lifecycle Data Movement

Provides services to migrate or move data from one data repository to another, as befits both the storage and content lifecycle of the data or appropriate aggregate data category, such as Document Class.

External What?

Data in external legacy repositories, typically accessed by application connectors.

Content Replication

Service used to replicate content of all types, which also works to speed local storage and retrieval performance. Only the content is replicated, not the metadata (catalog).

Storage Services

Note: With the exception of the Soft WORM device type and its Retention capability provided by IBM FileNet, all capabilities and device types in the Storage Services layer of the ERA are provided by third-party storage hardware and software providers. All components shown are specifically supported and leveraged by the IBM FileNet P8 platform.

Search

Search technology and search engines now being embedded and shipped with certain storage subsystems. This is potentially leveraged by the tiers above to provide full-text searching of the content on the device.

Rewritable Disk

Standard magnetic disk, including Direct-attached, and SAN-, NAS-, and iSCSI-attached disk subsystems of all types.

WORM Disk

Magnetic WORM (Write Once Read Many) disk, including product offerings such as NetApp's SnapLock, EMC Centera, HDS Data Retention Utility (DRU), and others.

Data Migration

Provides services to understand and effect the migration of documents and data between different tiers of storage and different storage devices and methods.

Soft WORM

A software implemented WORM device on top of magnetic storage. Usually offers a document locking model, which prevents document changes and supports retention modes of any time period, up to infinite retention, meaning the stored content can never be deleted via IBM FileNet.

Storage Integration Abstraction Components

Represents storage vendor-provided software or hardware that enables integration and data movement to different types of storage devices. Included are HSM-type software products such as IBM's Tivoli Storage Manager, and hardware-based integration abstraction technology such as Hitachi Data Systems' TagmaStore Universal Storage Platform and NetApp's V-Series. (The box in the IBM FileNet P8 Enterprise Reference Architecture diagram representing this is shown larger than the others in the top tier of Storage Services. This is because it is possible for the Storage Integration Abstraction Component - a full-featured HSM for example - to provide at least some of the other capabilities shown in the layer itself (e.g., data migration, retention).

Optical

WORM and rewriteable optical technologies. IBM FileNet P8 directly supports IBM FileNet WORM optical libraries (12-inch disk, capacity to 30GB), HP multifunction magneto-optical (MO) optical libraries (5.25-inch disk, capacity to 9.1GB, WORM or rewriteable media), IBM multifunction MO libraries under AIX (5.25-inch disk, capacity to 9.1GB, WORM or rewriteable media), and the newer 30GB Ultra Density Optical (UDO) technology in either HP or Plasmon libraries. Compatible NFS or CIFS-compliant HSM software can be used to support many other optical devices not supported directly.

Tape

Tape technologies of all types used as a storage device for a repository. Typically, these will be secondary or tertiary storage devices. Prominent installations include StorageTek tape silos, both with and without other installed repository storage technologies, such as optical. Many popular tape technologies and libraries are also supported for both document and relational database backup, using either IBM FileNet- or prominent third party vendor-provided backup software.

Hybrid

Devices combining two or more supported storage technologies, such as magnetic disk subsystems with integrated tape backup.

Replication

Data replication provided by storage vendors used for disaster recovery purposes, and in some cases, to enhance storage and retrieval performance. Typically array-based, both synchronous and asynchronous, storage replication examples include EMC's SRDF, Centera replication, NetApp's SnapMirror and Synchronous SnapMirror, and Hitachi Data Systems' ShadowImage.

Non-electronic

Includes paper and other physical storage media. Example: Along with directly dispositioning records stored on electronic media, IBM FileNet Records Manager file plans and disposition schedules specify records retention procedures for paper-based records as well, a capability required by certain regulatory mandates, including the US DOD 5015.2-std.

Retention

Document and data retention capabilities typically provided by storage hardware and software vendors, often a specific feature of the storage device itself. Examples include permanent retention provided by removable media technologies (optical, tape), and storage level enforcement of variable 'retention period' settings from software supporting or embedded on newer magnetic disk-based WORM offerings. Soft WORM device type also enables document immutability and retention on magnetic disk.

Other

This category includes non-traditional existing storage technologies such as static RAM drives, as well as emerging and new technologies supported in the future.

Surrounding Layers

This section highlights the other layers that surround the ECM- and BPM-specific layers and services in IBM FileNet's ERA definition. These surrounding layers are:

- Management Services
- Security Services
- Integration Services
- Development Services

Management Services

Enterprise System Management

Provides services to monitor, alert, and manage changes in system health and enable IT organizations to meet their service level agreements.

Service	Description
System Health	Monitor the uptime of the systems in real-time. Be able to identify problems before they occur and generate alerts when pre-defined thresholds are reached related to system health. Be able to archive data for historical analysis and management reporting.
Availability	Monitor and generate alerts related to system and network availability.
Alert/Thresholds	Be able to define a variety of thresholds and receive alerts via email and/or the operator console when the thresholds are met or

	exceeded.
SNMP/JMX	Simple Network Management Protocol (SNMP) has become the de facto standard for network management and is widely used by the leading Enterprise Systems and Network Management (ESM) vendors including IBM Tivoli, HP, Computer Associates, and BMC. Java Management Extensions (JMX) is a new J2EE specification and API for managing and monitoring devices, applications, and service-driven networks. These two ESM standards provide the communication protocol for data center operators and administrators to obtain real-time system health information from IBM FileNet P8 and other systems into their ESM tool of choice.
Log File Monitoring	Intelligent log file management that automates the analysis of log files for fault detection, fault prevention, and Service Level Agreement (SLA) compliance. This includes the filtering, escalation, and de-escalation of events, and monitoring of log files. The event information about potential and detected error conditions allows system operators to diagnose and resolve problems faster and more efficiently. The information may contain the original error message, description of the cause, and potential corrective action.
SLA Reporting	A Service Level Agreement (SLA) is a contract to provide or receive a certain level of service for a certain period of time. An SLA report measures how an organization is performing against the SLA agreement in place.
Console	A Webconsole, usually thin such as Web, where thresholds, time periods, and notification methods can be defined and error messages and severities displayed in real-time.

Performance Monitoring

Provides services to monitor and measure system performance to ensure quality of service is maintained.

Service	Description
Throughput	Monitor and measure system throughput. This is designed to measure the average amount of work performed by the system.
Response Time	Monitor and measure system response time. This ensures the applications are performing within the accepted time intervals.
Dashboard	A Web console that displays summary and detailed graphs of application and/or system performance. Application specific, environmental, and operating system data would be monitored and displayed including CPU load, disk I/O, network I/O, and memory utilization.

Disaster Recovery

Provides services to recover from a failure.

Service	Description
Backup/Recovery	Enhance and optimize backup and recovery routines (like allowing online backups of active file repositories).
Data Replication	A geographically remote mirror of a running system including the database, file storage, and full index data.
Recovery Site	Manage offsite storage and recovery in a separate remote data center site.

High Availability

Provides services to ensure maximum uptime.

Service	Description
Server Farms	Hardware or software technology that provides high availability at the Web server tier. They provide server redundancy and scalability because all of the servers in a Web server farm are active. A load balancer automatically detects the failure in one server and redirects the user to another server in the farm.
Redundancy	Backup server that is available if a failure occurs in the primary server.
Server Clusters	A set of servers where only one server in the cluster is active at any one time unlike a load-balanced Web farm.

System Administration

Provides services to help manage a production environment more effectively.

Service	Description
Silent Install	Installation that can be performed without human intervention (e.g., one click).
Backup/Restore	Ability to store and retrieve data in file systems and databases onto tape or other media in case of a system failure.
Patch Management	Software patches for bug fixes of vendor applications and operating systems.

Upgrade	Process of updating application and/or system software when a major or minor release of the software becomes available.
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Capacity Planning

Provides services for ensuring the existing and future IT infrastructure meets the needs of existing users and transaction rates as well as future needs.

Service	Description
Growth Simulation	Model the utilization rates and ability for the existing systems to handle future growth in usage and transactions.
System Sizing	Size the workload and utilization rates of the system to ensure it performs optimally under heavy loads.

Security Services

Content

Service	Description
Digital Signature	Electronic signatures for the purpose of identification and authentication.
Object-Level Security	Authorize access to IBM FileNet P8 objects. Default access rights can be defined for each class of objects.
Digital Rights Management	Digital Rights Management (DRM) is an umbrella term referring to any of several technical methods used to control or restrict the use of digital media content on electronic devices with such technologies installed. The media most often restricted by DRM techniques include music, visual artwork, and movies.
Timestamp	A digital or electronic notary that provides digital evidence that data has not been altered.

Identity Management

Provides services that deal with identifying individuals in a system and controlling their access to resources within that system by associating user rights and restrictions with the established identity.

Service	Description
Encryption	Computer encryption is based on the science of cryptography to securely transmit data over networks in real-time or store data and documents in databases and/or file systems.
Authentication / Single Sign-On	<p>Authentication is any process by which you verify that someone is who he or she claims they are. This usually involves a username and a password, but can include any other method of demonstrating identity, such as a smart card, retina scan, voice recognition, or fingerprints. Authentication is equivalent to showing your drivers license at the ticket counter at the airport.</p> <p>Single sign on (SSO) enables users to authenticate themselves once, after which they can directly access any application on the network for which they have permission.</p>
Authorization	User, group, or role-based authorization to provide access to resources. Authorization is finding out if the person, once identified, is permitted to have the resource. This is usually determined by finding out if that person is a part of a particular group, if that person has paid admission, or has a particular level of security clearance. Authorization is equivalent to checking the guest list at an exclusive party, or checking your ticket when you go to the opera.

Policy Management	Create, update, and delete security policies.
LDAP / Directory Services	Authenticate users and groups using corporate Directory Servers/Services. Lightweight Directory Access Protocol (LDAP) is a standard commonly used by commercial Directory Servers for storing and managing users and groups.

Perimeter

Provides services for securing the outer edges of the corporate network, including management of viruses, Spam, network attacks, etc.

Service	Description
Proxy/Gateway	Manage information flow into or out of the organization.
Firewall	Control and manage firewalls between segments of the corporate network.
Anti-Virus	Scan and eliminate viruses that come into or go out of the organization.

Model

Provides services that manage the type of security models that can be accessed and used.

Service	Description
Group-based	Ability to manage group-based access control.
Role-based	Role-based access control (RBAC) is the ability to make access decisions based on the roles that individual users have as part of an organization. Access rights are grouped by role name, and the use of resources is restricted to individuals authorized to assume the associated role. The use of roles to control access can be an effective means for developing and enforcing enterprise-specific security policies, and for streamlining the security management process.
Inheritance	Ability for a document, folder, or object to obtain the same security attributes/permissions from another document, folder or object. For example, once a folder is set to inherit its security from a parent folder, all subsequent sub-folders will automatically inherit their security settings from the parent folder.
Distributed	Provides services to make the provisioning of access rights easier (should support distributed rights assignment and centralized revocation).

Integration Services

User Interface

Provides services to integrate user interfaces including desktop applications and portals.

Service	Description
Portal	Provides ability to integrate portal content and applications together in a single portal interface.
Desktop Applications	Ability to integrate with popular applications including Microsoft Office and Outlook enabling users to manage documents and email within a repository directly from the user's desktop application.
WebDAV	Web-based Distributed Authoring and Versioning (WebDAV) is a set of extensions to the HTTP protocol that allows users of WebDAV-compliant desktop applications to manage documents within a repository directly from the user's desktop application.
Roles	Ability to allow or deny access based upon the user's role in the organization.

Process

Provides services to integrate processes across multiple process engines and/or tools.

Service	Description
WS-BPEL	Provides an interface for Web Services Business Process Execution Language, a standardized format to define business processes.
Rules	The embedding of business logic affecting the flow of work through a business process either in the routes of a process definition or rules set in a Business Rules Engine (BRE).
Component Integration	The integration of automated steps via standard technology interfaces including Message Queues (such as the Java Message Service, JMS) and Java components.
Web Services	Provide an interface to access underlying services using XML Web Services protocols and standards including Simple Object Access Protocol (SOAP) and Universal Description, Discovery and Integration (UDDI).
Rules Connectivity Framework	Reusable framework allowing for multi-level integration of leading Business Rule Engines. Process integration can occur at the design, run-time and audit stages.

EAI Connectivity Framework	Reusable framework facilitating the development of connectors to leading Enterprise Application Integration (EAI) tools. This allows organizations to leverage their existing investments in EAI tools from within the process definition environment.
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Content

Provides services to integrate content repositories, either directly or virtually.

Service	Description
Federation	Ability to access and manage disparate content located in multiple repositories from a single location / user interface.
Events	Ability to access and update repositories and systems based upon event actions that take place.
Connectors	Interfaces that integrate with a range of content repositories, databases, and external systems.
JSR170	Provides support for JSR 170, a standard that allows developers to access simple library services in a standardized manner.

Collaboration

Provides services to integrate collaboration solutions (e.g. unifying instant messaging engines).

Service	Description
Synchronous	Provide integration framework for leading Web conferencing technologies such as WebEx. The integration framework allows for creation of the online meeting object with properties such as: subject, agenda, start time and date, attendees, and duration. Moving forward, the integration framework could be extended to allow for aggregation of instant messaging technologies.
Asynchronous	An SMTP server lays the foundation for future integration to desktop applications such as Microsoft Outlook and IBM Lotus Notes. Future integrations may include: using an email client to complete tasks, replying to discussion postings, and responding to polls.

Business Applications

Provides services to integrate with enterprise applications including packaged and legacy applications.

Service	Description
CRM	Ability to integrate and access content residing in a customer relationship management application.
ERP	Ability to integrate and access content residing in an enterprise resource planning application.
Legacy	Ability to integrate and access content residing in a homegrown application.

Infrastructure Applications

Provides services to access reporting and system management tools.

Service	Description
Reports	Ability for an organization to utilize a best-of-breed reporting / business intelligence tool for generating and distributing statistical data and reports.
System Management	Ability for the system administrator / operator to proactively monitor the health of systems and applications utilizing enterprise system management software/tools.

Security

Provides services to integrate different security models and solutions into a unified security model.

Service	Description
Single Sign-On	A mechanism whereby a single action of user authentication and authorization can permit a user to access all computers and systems where he/she has access permission, without the need to enter multiple passwords.
Directory Services	A directory is similar to a database, but typically contains more descriptive, attribute-based data; that is, data read more often than it is written. Also, a directory contains data that is concise and strictly relevant to an entry. By contrast, a database contains large amounts

	of data for each entry that may or may not be directly relevant to the entry. Lightweight Directory Access Protocol (LDAP) is the protocol used by industry leading directory service products widely used today.
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Development/APIs

Provides services for application developers to access enterprise content and process management capabilities through standards based Application Programming Interfaces (APIs).

Service	Description
COM	Component Object Model (COM) is an object-oriented programming model used by Microsoft developers in a Microsoft Windows environment.
Java	A popular object-oriented programming language for developing applications.
.NET	.NET is a Microsoft API. The .NET Framework class library is a library of classes, interfaces, and value types that are included in the Microsoft .NET Framework SDK. This library provides access to system functionality and is designed to be the foundation on which .NET Framework applications, components, and controls are built.
XML Web Services	A standards-based mechanism that established a message-based protocol that enables a client to discover and consume services offered by a server. The self-describing nature of XML Web Services allows for the dynamic discovery of services and accommodates application development in J2EE and .NET environments.

Data

Provides services for the exchange of data and processes between applications and systems using standards-based technologies.

Service	Description
EAI	Provides support for Enterprise Application Integration (EAI) adapters / technologies to access and update business applications, databases, and other external systems.
Messaging	Provides support for messaging technologies for reliable communication and integration with business applications and other external systems.

Development Services

Process Design and Development

Provides the functionality to design process models. May include facilities to design or render the processes graphically. Often includes some optimization capabilities, whether via simple reporting or design time tips and alerts. Best practice solutions will include simulation services.

Service	Description
Business Process Framework	A framework for rapidly developing and deploying BPM applications that addresses unique user interface requirements, provides added role-based work distribution features, more flexible work delivery, case management control, and comprehensive data entry options.
Modeling	Provides services for process design, such as the development of process flow steps and the application of attributes such as user profiles, security, or external system interaction.
Optimization	Provides services for process optimization, such as analysis of efficient paths, and leveraging of simulated flows to collect timing and performance data.
Simulation	Provides services for process simulation. Key components include the ability to define inputs from external systems, the generation of events, and the tracking of results. Also supports the saving of specific simulation scenarios. May support simulation based on prospective data or actual data with modeled input data (i.e., to determine what will happen to my current process if a change is made).
Reporting	Provides services for the creation and layout of process activity and audit reports.
BPMN Support	Support the Business Process Management Notation (BPMN) standard. This allows users to define their business processes in an industry accepted format.

Application Design and Development

Provides services to assist in the design and development of applications.

Service	Description
Application and Data Modeling	Provides services for modeling application and data flows.
Integrated Development Environment	Provides services related to extending or enhancing the integrated development environment to aid in development.

User Interface Designer	Provides services for the design and layout of Web pages, HTML templates, and style guides.
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Forms Design and Development

Provides services to manage the electronic forms design and development process.

Service	Description
Template Designer	A high fidelity form design environment that allows multi-page forms to be created that can faithfully represent the paper form counterpart.
Policy Designer	Provides the ability to add logic to form templates by defining data fields, data types, formatting, calculations, validations and external data integration.
Schema/Logic Design	Form policies pull together form templates, entry templates and workflows that define how a particular form process behaves.

Object Design and Development

Provides services to import, create and manage document, folder, and custom object classes, properties, security policies, lifecycle policies, and event subscriptions. Tools for the creation and management of entry templates, publishing templates, and search templates.

Service	Description
Object Designer	Tool for the creation and management of document, folder, and custom objects as well as object stores.
Search Designer	Tool for the creation and management of search templates and stored searches.
Publishing Designer	Tool for the creation and management of publishing templates for the renditioning of documents from one format to another.
Content Entry	Entry template to specify required and optional metadata fields for adding new documents into the repository.

Testing and Debugging

Provides services to manage the quality assurance process.

Service	Description
Code Control	Manage code with check in/check out support along with code branching, etc.
Deployment to Staging	Move code and application content from a development or quality assurance environment to staging.
Rollback	Leverage the version management system (1.1.8.4.5) to rollback change as needed.

Deployment

Provides services to manage the entire application deployment process.

Service	Description
Change Tracking	Manage the change control process to ensure high quality deployments.
Audit trail	Provides auditing as applications move through the deployment process.
Production Deployment	Move code and application content from a development environment, quality assurance, or staging to production.



About IBM ECM

As the clear market leader in Enterprise Content Management (ECM), IBM's ECM solutions help organizations make better decisions, faster by managing content, optimizing business processes and enabling compliance through an integrated information infrastructure. IBM's ECM portfolio delivers a broad set of capabilities and solutions that integrate with existing information systems to help organizations drive greater value from their content to solve today's top business challenges. The world's leading organizations rely on IBM enterprise content management to manage their mission-critical business content and processes.

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