WORKFLOW SOLUTIONS

InfoImage
Technical Overview Guide

UNISYS

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Section 1
Concepts

Unisys e-Workflow and Imaging is a comprehensive document management solution for capturing, indexing, storing and sharing information across the enterprise. Business documents can enter the system via high-speed scan, fax, or the Internet to create electronic documents.

Features include:

- Full administration from a centralized console,
- Modular components for easy customization,
- Microsoft VBA technology for fast performance and integration, and
- XML-based forms for Web performance.

The workflow solution has an easy point and click approach to creating workflows without writing code, and routing workitems to designated personnel for timely processing.

Workitems

The basic unit on which work is done is called the *workitem*. There are two types of workitems:

- Folders
- Documents

Every workitem has the following properties:

- Contains a data form that holds machine-readable coded data.
- Has two identifiers: a name and a unique internal ID.
- Belongs to a class of workitems that share certain attributes.
- Can be viewed at a workstation.
- Can be routed from one user to another.
- Provides a workitem (document and folder) history.
- Can be saved to long-term archival storage.

The differences between these two types of workitems are described in the following sections. Batches and an object called an *attachment* are also discussed. While not actually a workitem, it has many of the same properties.

Batches

A *batch* is a container for one or more pages. A *page* is one or more electronic images created at a scanner, received as a fax, or generated directly from an external source. These pages can be grouped into documents and have notes and attachments. Batches are usually created using the Unisys Imaging High-Volume Scanner (HVS) or Unisys Imaging Scan Manager.

When a batch is released to workflow, the container is committed and the batch is converted into either individual documents or a folder of documents. When a batch is released to an archive, it is converted into individual documents. At the workstation, a batch can be stored temporarily on the desktop.

Folders

A *folder* is a container that can hold one or more workitems (but can also be empty). The items in a folder can be documents, attachments, or other folders. These items are stored within the folder by reference; that is, the folder is a list of the IDs of its constituent items. Therefore, a document, folder, or attachment may reside in more than one folder at a time.

You can use folders to establish a storage hierarchy. For example, a company folder may contain several account folders, each of which contains a correspondence folder, a contract folder, and a financial statement folder.

You can also use folders to maintain a group of documents that should be processed consecutively by the same user. The system can be configured to create a folder at a Workflow Domain Subsystem from all the paper documents that were batched at the scanner.

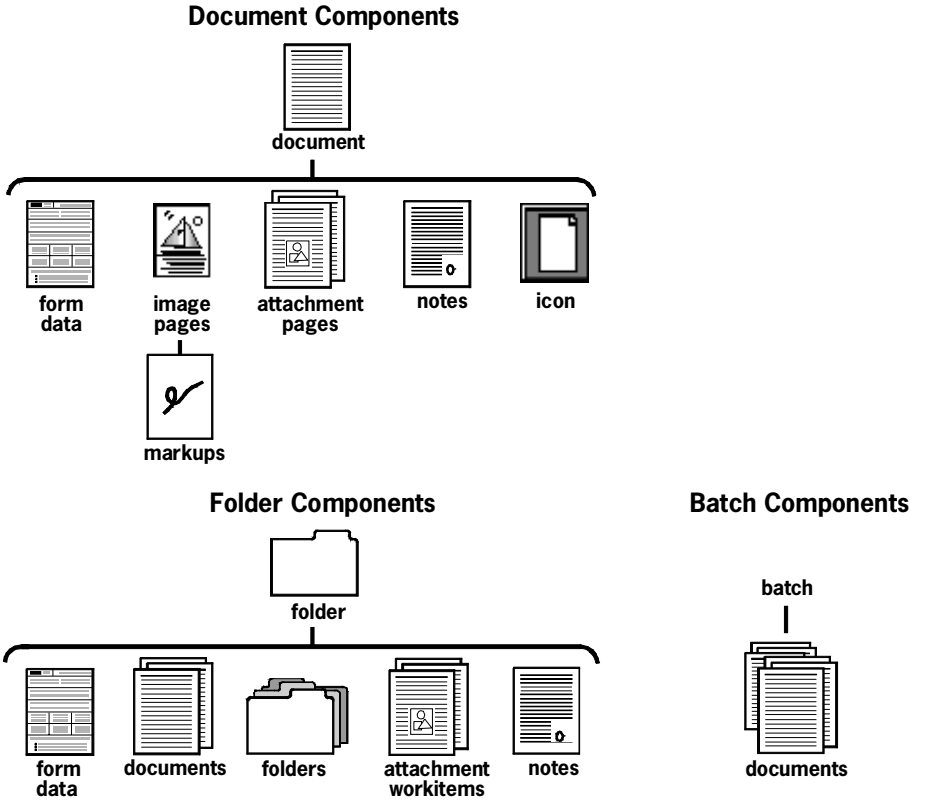
Documents

The software can work with both image and non-image documents. An *image document* consists of one or more electronic images called *pages*. These pages are created at a scanner, received as a fax, or generated directly from an external source, including conversion of XML-based Internet data. Pages can be single-sided or double-sided and generally range in size from 4-by-6 to 8.5-by-14 inches or larger. Double-sided documents appear as two images on the workstation screen.

Image documents require large amounts of storage: about 50,000 bytes of storage per page after compression. Thus, a 20-page document may require approximately one megabyte (MB) of storage.

It is also possible to create a *non-image document*, which is a document with no image pages. Non-image documents are typically created by an automated process from external data.

The following illustration shows you the contents of batches, documents, and folders.



Attachments and Imported Items

An *attachment* is a file created by a word processing, spreadsheet, or other type of program. A third-party viewer is required to view the attachment, usually the same program that created the file. An attachment can require less storage per page than an image document. You can alter an attachment at any time (as long as the document or folder where the attachment was imported can be altered).

Attachments enter the system by being imported into documents or folders. During the import process, the user associates a class with the attachment. The class determines the icon used to represent it on the desktop and the program that is called to open the document.

Notes

A *note* is associated with either a document or a folder. A note is unstructured text containing character data. Notes are usually entered by an operator.

Required Workitem Attributes

All workitems have an *ID* and a *name.* At the time a workitem is created, the system assigns a unique ID. You cannot change this ID. You can, however, change the workitem name. The system does not require the name to be unique. Workitem names have a maximum length of 44 characters.

All workitems belong to a *class*. Workitems in the same class share the same attributes. For example, all workitems in a class use the same form definition. For more information about classes, see the "Classes" section later in this section.

Each workitem contains *form data* with a structure that is defined by the *form definition* named in its class. Some or all of the form data can be entered at the time the document is created at the scanner. It can be entered or changed (based on the user's access privilege) whenever the workitem is processed at the desktop. An automated process can also be established to do the same things.

As an example, a field within the form definition might be declared with the name of "Zip Code," a length of 5, and a type of "digits only." The associated value, "10017," might be stored in the workitem's form data.

You can use the data stored in a workitem's form in several ways:

- Store information for other users who view the document at a later time.
- Use some values in the form to index the document. For example, if the Zip Code field has been declared as an index field, a user can search for all documents with the Zip Code of "10017."

When the software decides where to send the workitem next, it uses data within the form to make that determination. For more information about the uses and sources of form data, see the "Forms" section later in this section.

Storing Workitems

When workitems are stored, either in magnetic storage within a department or in optical storage at the archive, each workitem is stored as the following files:

- A variable component file that contains all non-image data. All workitems contain some variable data; therefore, all workitems must include this file.
- A static component file that contains the image data. Because image data is an optional part of a workitem, this file is also optional.

To save on optical media, when a document is archived, you have the option not to rewrite unchanged files. The order of the pages and a list of deleted pages are both stored in the variable file— decreasing the chance that the relatively larger static file will be rewritten.

Locking Workitems

When users plan to make changes to a document or folder, they want to be assured that no other user can make changes until those changes are saved. If it were possible for two or more users to obtain the same document and make changes, only the work of the last user who saved the document would be stored. Everyone else's work would be lost.

To prevent this problem, a user can lock a workitem. When a workitem is locked, it is reserved for modification. Only one user can lock a workitem at a time.

A user may receive a workitem locked (this usually happens when the workitems are retrieved by users participating in workflow) or may have to request explicitly that an unreserved workitem be locked to that user. Likewise, unlocking can be done automatically by deleting a locked workitem from the desktop or by request.

The system administrator needs to determine if workitems in workflow can be reserved for modification when retrieved from the File Cabinet (and not currently locked to another user) by a user. There is danger in permitting a user to modify an item that has not been received through workflow. The user might change a field value and unknowingly cause the workitem to take a different path through the route. You can turn this option on or off for each Workflow Domain.

Internally, there are two parts to a lock:

- The Workflow Domain lock - When there is more than one Workflow Domain in an enterprise, the same workitem can be in two or more Workflow Domains at once, but only one Workflow Domain can have the Workflow Domain lock. Only the Workflow Domain that has the Workflow Domain lock can grant user locks.
- The user lock - Even if no user currently has a lock on any copy of this workitem, one copy may have changed. If any user requests a modifiable copy of this workitem, that user must receive the changed copy, or else the new changes will eventually overwrite the old changes.

The catalog maintains a *Workflow Domain lock,* which indicates the Workflow Domain that has the most recent version; this is also the only Workflow Domain permitted to grant a *user lock*. If a user in another Workflow Domain requests a reserved copy of the workitem, the Workflow Domain lock and the most recent version of the workitem must both be transferred to the requester's Workflow Domain before the user lock can be issued.

Users do not need to be concerned with these internal mechanics of locking. A request for a reserved workitem either succeeds when there is no conflicting lock, or fails when there is. When a request for a reserved workitem fails, the user making the request is given the name of the person currently holding the lock. When the request for a reserved copy succeeds, the locked workitem always includes all prior changes.

Workflow History

For each document and folder, the system maintains a history of the path the workitem took through workflow. This history is comprehensive: if the workitem has passed through workflow more than once, the history includes information on all workflow cycles.

You can access a workitem's history using the workstation or the CAL OLE Automation Interface.

Image Pages

Images exist as pages within documents or, temporarily, in a batch. Images can be created by:

- Scanning pieces of paper.
- Receiving an incoming fax.
- Importing through an image gateway.

Image pages must be assembled into a document before they can be committed to an archive or a Workflow Domain Subsystem.

For conversion to electronic files, images are broken into *pixels,* a term derived from "picture elements." At a resolution of 200 dots per inch (DPI), each square inch consists of 40,000 pixels.

Because the system stores pages as bitonal images, each pixel is rendered as either black or white. One bit is required to store each pixel. Therefore, an 8.5-by-11-inch document at 200 DPI requires 467,500 bytes of storage before compression. For a discussion of how compression can reduce these storage requirements, see the section entitled "Compression."

Other resolutions reduce or increase the amount of storage required, with a trade off in image legibility. For example, the same page at 100 DPI requires only 116,875 bytes, but the page may be harder to read, especially if the type is small. At 300 DPI, the page requires 1,051,875 bytes, but the page is easier to read.

The system optionally accepts color or gray-scale images in addition to the bitonal image. When a user opens an attached page or document at a workstation, the color image is used. Older workstations will continue to see the bitonal image.

Markups

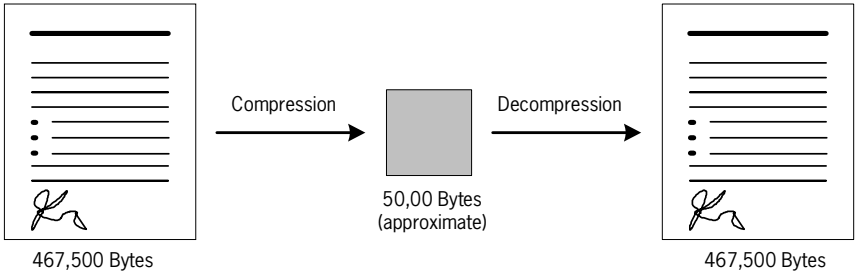
A *markup* is a graphic or text message that can be placed on a page. Markups include annotations, highlights, stamps, and initials. After creation, a page image cannot be altered, but it can be annotated or marked up.

Compression

Image processing would be prohibitively expensive without using compression to reduce storage requirements. The system compresses all electronic images at the time they are created, and they remain compressed until they are displayed.

The decompression used by the system yields an exact duplicate of the original image. No data is lost in the process of compressing and decompressing the image.

The following illustration shows you the approximate number of bytes contained in compressed and decompressed images.



The system supports the CCITT Group IV compression algorithm for internal processing. JPEG is used for color image compression. In addition, it supports conversion to and from the CCITT Group III algorithm for outbound and inbound fax images.

Compression can yield anywhere from a five-fold to twenty-fold reduction in image storage requirements. A compression ratio of 10:1 is typically used for estimating storage requirements for business documents. This ratio may vary greatly, depending on the nature of the documents.

An incorrectly estimated ratio can have a significant impact on the hardware requirements for an installation. It is extremely important to determine the appropriate compression ratio by scanning sample documents. Note that the scanner software displays the compression ratio for scanned documents.

Storage Format

The native storage format for images is Tagged Image File Format (TIFF) level 6. Using the TIFF standard does not guarantee compatibility with other image systems. There are many options within TIFF and different levels of compatibility. In general, images should be readable by any Version 6-compliant TIFF reader that supports CCITT Group IV compression and the byte-order and fill-order tags. The system uses private tags to include the optional color image.

Because fax transmissions use Group III compression, the fax server software converts between Group III and Group IV when receiving or sending a fax.

Dropout Ink and Image Overlays

Paper forms often include preprinted background information such as boxes and titles. The form background is needed when using the paper form, but it does not need to be stored. Paper forms can be printed in dropout ink that disappears when the paper form is scanned.

Because the background does not have to be encoded, you can achieve very high compression ratios using dropout ink. An image that normally compresses to 50,000 bytes may compress to approximately 10,000 bytes when you use dropout ink.

An *image overlay* is an image of a paper form containing background information only. When viewing or printing an image whose original paper form was printed with dropout ink, image overlays provide the background information that was removed.

You can create image overlays by scanning a blank form that has been printed using any non-dropout ink, usually black. The image is stored in the Workflow Domain as an overlay and then automatically downloaded to workstations when needed.

Image overlays are *dithered* before being merged with the underlying image. Dithering is a technique by which every other pixel of an image is forced to white. This gives the illusion of graying out the background information on a bitonal display and ensures that the image overlay does not obscure the underlying image.

Forms

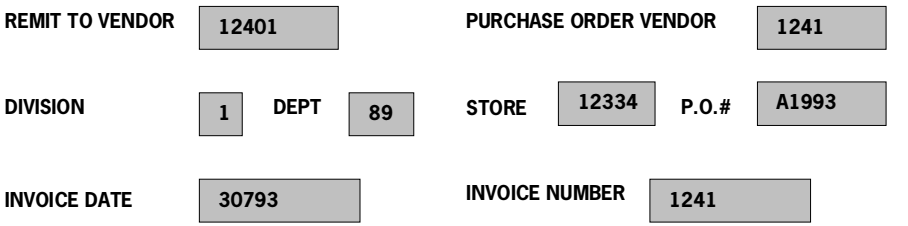
A *form* is structured data associated with a workitem and used to maintain standardized information about that workitem. The form definition provides the structure for the data in the form. It is created with the Forms Creator tool.

You can use data in a form to

- Index workitems.
- Process business transactions.
- Provide values for preprocessing and postprocessing rules in workflow.
- Exchange data with other programs.

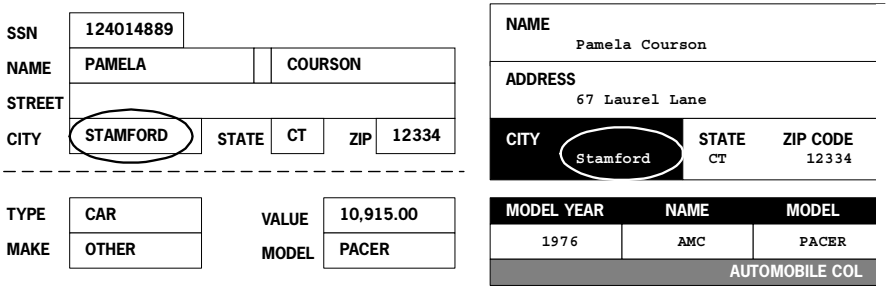
A form consists of the form definition and the form data, which may be supplied by either a user or a system process. A form appears in a form window.

A form field is a placeholder for a single data item within the form. The principal attributes of a field are its name, size, editing, and display characteristics. A form view is a subset of the fields in a form. You can use a view to define indexing fields and restrict access to certain form fields. The following illustration shows you how form fields appear on your screen.



Forms processing is important in a system, particularly when imaging is used in support of transaction processing. In forms processing, information from an image is captured and entered into a data record. This information is sometimes called *coded data* to distinguish it from non-coded information, such as an image.

Throughout this guide, the term "paper form" is used to indicate a piece of paper with a form printed on it, such as a tax return. The following illustration shows you a form field and its zone on the image (in reverse video).



A form can contain simple fields, multi-line fields, and tables. The system provides data validation capabilities based on type checking, value lists, range checking, and custom-written user exit routines. You can establish relationships between the coded data fields in the form and rectangles (called *zones*) in an image document.

These zones can be used for *image tracking,* Optical Character Recognition (OCR), and barcode recognition. You can also establish relationships between the coded data fields and the fields on a host terminal emulation screen.

A document's class determines which form is used for that document. You can use different views to simplify the screen layout for indexing and data entry. A form does not need to be displayed for the coded data to be accessible.

For example, someone using a 3270 screen for data entry may want automatically transfer certain status information from the 3270 session to the form for use in workflow routing. Conversely, one may want data fields that are successfully read using OCR to be automatically entered on the 3270 screen.

Example – Sources of Form Data

At the scanner, users can define a template for the form data, one template per document class. This template is stored as a file. Within this file, any or all of the fields can have values assigned. As each document is created, the values are copied from the template into the document's form data.

As each barcode is read at a scanner, its value is written into a field in the current document's form. The value for a persistent barcode is written into every document until a new persistent barcode changes the value.

At a workstation, a user can type values directly into the form. When a user types values into a terminal emulation screen, those values can be copied with a single keystroke to the form, based on the mappings set up by the system implementer using the workstation's ActiveX integration options. This facility eliminates the need to key data into both the host terminal and the document's form. (If so configured, data can also flow in the opposite direction; values typed into the form can also be copied automatically to the host.)

While users type values into a field, custom routines running as user exits at the workstation can fill in other fields automatically. For example, when a user has finished entering a customer number, the user exit can perform a database lookup to enter the name, address, and credit limit into the appropriate fields.

A custom-written process running on the Workflow Domain Subsystems can open documents that arrive at a given step in the workflow to read and or modify the form data and to perform many other functions. Such a process might transfer data between a third-party database (such as Microsoft Access) and the form.

Existing groups of TIFF files and associated data can be converted into the appropriate image and form data format for introduction into the system using Rapid Batch Entry (RBE). A partner process, the Document Generator, actually introduces the converted files as batches of documents.

Classes

Each workitem belongs to a workitem class, and each attachment belongs to an import class. Classes are defined using the Central Administration Console. All workitems in a class share the same form definition for indexing, routing, and data entry. For documents, the class also defines the image overlay used for dropout ink images. The class is assigned at the time a workitem is created. You can change the class at a later time using the Reclassify function at the workstation.

Barcoding can be used to specify automatically the class of a document during scanning. In a claims processing system, document classes might be used to identify the claim type such as HCFA1500, UB82, and HAC1433. Alternatively, the scanner operator can enter the classes for presorted batches.

Object-Level Security

The system includes a feature that allows the administrator to limit the access of each user to specific classes of workitems. This access to each class is at one of three levels.

Access Type	Description
Read/write	The user can retrieve documents and folders in a modifiable state.
Read-only	The user can retrieve and view the workitem but not modify it.
Hidden	The user never sees the workitem in the InBox or the File Cabinet.

Access levels are managed by assigning users to one or more groups. A group assigns one of these three levels to each class of workitems.

For example, a group named Letters, which processes correspondence about applications for new business, might have the following types of access:

- Read/write access to the class of letters.
- Read-only access to the class of applications.
- Hidden access to the class of payroll documents.

Indexing

You can always retrieve workitems by name. Another retrieval method is based on form data fields specified as *index fields*. These fields are maintained in a database so that a query can determine all the workitems whose data values match the requested values.

Because organizations can have very different requirements about how such searches should be done, a variety of configurations are offered for this component of the system. Only the simplest option is described here. This section introduces the vocabulary and defines the basic issues.

The system administrator defines the index fields by using the Forms Creator tool to specify the *SQL view* (because internally an SQL query is used to search the database for matching values). These index fields are associated with columns in a single table in the database called the *Attributes table*. Each row in the table represents some workitem that has been indexed. The first four columns contain the standard fields: ID, name, workitem type, and the address of the workitem (either the server name or ARCHIVE). The remaining columns are the union of all unique index fields across all forms used for indexing workitems.

If data fields in the form's SQL view are changed, they are copied to the Attributes table at the time the document's form data is saved.

This database table is transparent to the user, as is all use of the system's databases. When searching the File Cabinet by index values, a user types values into one or more fields in a form called a *query form*. These values are translated internally into an SQL statement that finds the workitems in the Attributes table that match the specified values. The user can then choose to retrieve any of the listed workitems.

Any number of these query forms can be created using the Forms Creator tool. The Central Admin Console is used to install these forms and to assign them to specific users.

Processing Workitems

The software is modular and requires the following components:

- The Workflow Domain Subsystem software handles the central processing, including maintaining records for workitems stored on that machine, providing workitems to users who request work, and retrieving workitems from archival storage in response to user requests.
- The workstation software provides a user interface, which includes windows for displaying workitems with their images and forms, dialog boxes for requesting the printing of documents, and many other tasks.

The system also provides optional components that include (but are not limited to):

- *Imaging High-Volume Scanner*, which creates electronic documents from the output of scanners.
- *Archive Manager*, which manages the long-term storage of workitems and their retrieval.
- *Relational Catalog,* which maintains the addresses of archived workitems.
- *Print Manager*, which manages the printing of documents.

Custom services can also be integrated to extend functionality and to integrate with existing business applications.

After you create a workitem, it can be stored at a Workflow Domain Subsystem, in an archive, or both. Workitems maintained at a Workflow Domain Subsystem are filed on the magnetic hard disks, and are referred to as "in the Workflow Domain" or "in the department." When saved to an archive, workitems are filed on optical platters and stored in jukeboxes. Databases maintain information about the location of these files as well as other details.

Before a user can open a workitem at a workstation, the workitem must reside on a Workflow Domain Subsystem in the Workflow Domain to which the user has logged on. If the requested workitem is not currently in that Workflow Domain, it can be automatically retrieved from the archive or transferred from another Workflow Domain within the enterprise.

When a document is first created, it is generally released to *workflow*. This term refers to a system that routes workitems from workstep to workstep under program control. Workflow is managed at the servers.

Each user can also receive workitems in the following ways.

Method	Description
InBox	The user opens an InBox to retrieve a workitem. The user sees a list of workitems that are awaiting processing at that step.
File Cabinet	The user requests workitems from the File Cabinet either by name or by specifying values for index fields.

The File Cabinet, technically speaking, contains query forms and query results (lists of documents associated with the query form), not workitems. Only the documents or folders under the Workitems folder are workitems. Query forms equate to a physical filing cabinet that contains folders with documents organized in some logical fashion. Each query form is a different filing cabinet with a different organizational logic (the query form). After you run a query, matching documents or folders are listed under the query form name. When you retrieve a document or folder from the query results list to the Workitem folder, then it becomes either a document workitem or folder workitem.

Processing Modes

Image processing systems can be used to support both transaction processing and the filing of documents. The use of images in transaction processing is called *image-enabled transaction processing* while their use in filing is called an *electronic file cabinet*. A typical system installation incorporates elements of both modes.

Image-Enabled Transaction Processing

In an image-enabled transaction processing system, imaging is used with an already existing transaction processing system, often a mainframe-based application. (A claims processing system is an example of such an application.) In transaction processing systems, paper documents are typically received in a mailroom, sorted by document type, and distributed in batches to different processing units within an organization.

At the processing unit, users working with mainframe workstations enter information into the system. The work may be completed at that stage or the paper document may need to be forwarded to another user. All incoming documents are typically processed within a few days of receipt. After processing, the documents are rarely used again unless a customer service problem arises.

In such a system, imaging is used to speed the movement of work throughout the organization. Instead of moving actual paper documents, the images of the documents are distributed electronically over a local area network. Using barcodes or OCR, it is possible to eliminate manual sorting and indexing associated with the paper documents by having the imaging system automatically identify the document type. The software organizes the movement of documents to processing units and individual users. At the workstation, users often work with an image document side by side with a terminal emulation screen.

An image-enabled transaction processing system may need to deal with very high volumes. As an example, a system handling the paper claim processing requirements of a company needs to process 150,000 paper claims per day, which is equivalent to over 400,000 pieces of paper per day. The system, with its multiple Workflow Domain Subsystems, is expressly designed for such an environment.

Electronic File Cabinet

In an electronic filing cabinet system, documents are stored away with the expectation that only a fraction of them need to be retrieved in the future. The system needs to speed document retrieval by allowing the users to index documents so that they can be searched for easily. Frequently, documents need to be organized into file folders to assist with retrieval.

Often, there is no way of predicting when a document needs to be retrieved, so such systems must provide fast access to a large number of stored documents. Because of the need to index documents using a variety of user-specified fields, the system incorporates an SQL database for document indexing.

The system, with its folder and document level processing, user-specified indexing fields, and variety of alternatives for optical disk storage, is also well suited for electronic file cabinet systems.

Document Creation

The system can create image documents:

- Using a high-volume scanner.
- Using a desktop scanner.
- From facsimile input at a fax server.
- Through a server process that uses API function calls to create documents from externally supplied data.
- Using Rapid Batch Entry and Document Generator.
- Manually at a workstation from externally supplied data.

The differences are explained in the following sections.

All of these entry points allow the documents to be placed into the workflow. Only the High-Volume Scanner and Document Generator allow documents to be released directly to the archive or dually released to both workflow and archive.

From a scanner, documents enter the system as a batch of one or more documents, with the size of the batch controlled by the user. At the fax server, each batch contains a single document. At scanners, electronic batches might correspond to batches of paper wrapped in a rubber band.

Creation of image documents includes the following steps: creating the images, assuring quality control, assembly, indexing, and commitment.

After a batch is committed (that is, released to the archive or to workflow), the system separates the batch into its documents and does not retain the batch as an object. If so configured, the documents can be filed automatically into a folder that moves through the route—permitting documents to remain together until they reach an unfolder step.

High-Volume Scanning

Documents are created from batches consisting of one or more pieces of paper. As paper is fed into the scanner, the system adds a single-sided or double-sided image page to a document until the end of the batch or the beginning of the next document is reached.

You can indicate breaks between documents in a batch with a micrographics patch on the first page of each document, separator sheets, barcodes, a keystroke, or by configuring the number of pages during scanning. The barcode recognition includes the interleaved 2-of-5 and 3-of-9 codes. It is possible to assign a document class to each document using barcodes.

If quality control is enabled, the images are displayed in an image window. Image pages are numbered sequentially within each document. After all the pages are scanned, the batch is saved and closed. Batches are cached on magnetic disk at the scanner controller until they are released to the archive, to workflow, or to both.

Fax Management

The system supports document creation using facsimile transmission. The fax server assembles an inbound fax as an image batch consisting of one document (or, if configured, consisting of one document for each page). The system assigns a default document class to the document and then routes the batch to an indexing step. After indexing, the document is committed and treated no differently than a scanned document.

CAL

A process running on the server can accept data from an external source. This data may or may not include images. Using calls to the CAL OLE Automation Interface, this process can construct documents and send them to workflow. An example of a document that does not contain any image page is mainframe data that the process extracts from a file and writes into a data form. This non-image document can be routed and archived.

Rapid Batch Entry and Document Generator

The Rapid Batch Entry process, running on a server, converts existing groups of TIFF files and associated data into image and form data format for introduction into the system. After this preparation is complete, the files are released to the Document Generator. This process, which is running on the same server as RBE, introduces the converted files as batches of documents into workflow.

Initial Indexing of Documents

Indexing allows a document to be retrieved by user-specified fields, in addition to its ID and its name. These fields are in a form that is linked to the document when its class is assigned. The way values are inserted into any of the form's fields depends on the method of capture.

Method	Description
High-Volume Scanner	Values are read from barcodes, from a data template called a superform, or through program control from an external source (for example, a host database).
Scan Manager	Using Scan Manager, index entries can be applied by any combination of the following: • By assigning a document class to a batch • By setting options to recognize barcode for indexing • By manually adding index entries while scanning a batch.
Fax server	Sender can enter the customer service ID (defined at the sender's fax machine), the port, and the date and time of receipt into the form before passing the document to an indexing step for entry of other fields.
Rapid Batch Entry	Indexing is performed when the RBE process converts existing data and TIFF files to the appropriate format for the system.
Batch Viewer	Using the Batch Viewer application, index entries can be applied or modified by any combination of the following: • By reclassifying a batch • By reclassifying a document • By adding index entries to individual document pages. In addition, you can perform index verification for the batch before sending the batch into workflow.

Indexing is sometimes done in conjunction with a host terminal emulation session. Host-based information displays in the terminal session, and then transfers programmatically to the document's form.

The fields within the form that are specified as indexing fields are also stored in columns of an SQL database. These columns are updated each time the form data is saved.

Section 2
Product Components

The core of the system is one or more servers attached over a Local Area Network (LAN) to workstations. The group of servers that are cooperating to provide image and workflow services to a department is called a *Workflow Domain*. Large single-site systems are built by linking multiple Workflow Domains over a LAN. The Archive Manager attaches an optical disk jukebox to the LAN. The Catalog is also attached to the LAN and is responsible for keeping track of where workitems are located in the archive on the optical platters. As an alternative to Archive Manager, Storage Manager provides the ability to store workitems on an NTFS file system and retrieve them on demand, using standard Windows commands.

For installations where processing occurs in separate buildings or in distant cities, these components are linked over a Wide Area Network (WAN). The system does not impose constraints on placement of shared resources, such as scanners and jukeboxes; these resources can be located based on the needs of the enterprise.

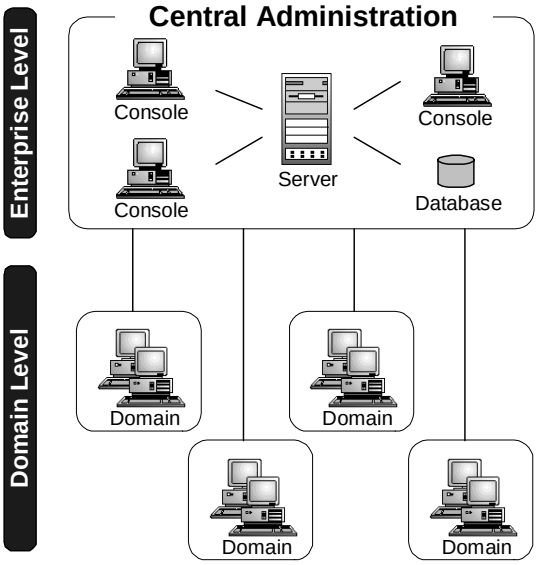
Central Administration Console

The Central Administration Console runs from the Microsoft Management Console (MMC), a common user interface that serves as host to a variety of administrative tools. Two of these tools, the Administration and Operations Consoles, provide a central point of access where users can communicate with Workflow Domain Subsystems in multiple InfoImage Workflow Domains, while maintaining an enterprise level database. In addition, the Central Administration Console hosts other administrative consoles, such as XML Gateway and Enterprise Licensing.

From the Operations Console, you can start and stop servers, monitor and manage workflow, view log and debug information, and perform other operational tasks. Equally important, the Administration Console offers a full set of administrative tools for managing your enterprise's users and data, with special emphasis on security and workflow administration.

Communications between the Central Administration Console and each Workflow Domain Controller is accomplished through an Update Utility.

The following illustration provides a simplified view of a central administration environment:



To maximize the flexibility of its usage, the Central Administration Console is available in any of the following configurations:

- Full console, includes all available consoles
- Administration Console only
- Operations Console only
- XML Gateway Console only
- Enterprise Licensing Console only

The Central Administration Console uses a standard console tree control to reveal the information and functions required to administer the system. As you click different items in the console tree, a details pane displays information, dialogs, and options appropriate to the selected item.

In the Administration Console, for example, if you select Forms under the Enterprise branch of the tree, the details pane will display the forms used in all Workflow Domains in the enterprise. If you select Forms under the Domains branch of the tree, only the forms used in that particular Workflow Domain will appear in the details pane.

Client Work Manager

The Client Work Manager provides user access to the system for workitem retrieval and display. With the Client Work Manager, a user can

- Retrieve documents from an Inbox.
- Retrieve documents and folders from the File Cabinet by name or by specifying index values.
- Display images.
- Mark up pages.
- Add notes to documents.
- Read and modify form data.
- Send the document either to another user or to the next workstep, as determined by routing rules.
- File documents in folders.
- View the workflow history of a workitem.
- Customize the desktop to meet individual needs.
- Use roles to define specific processing needs.
- Attach a workitem to an email message.

You can easily integrate the Client Work Manager with other applications, such as spreadsheets and word processors, and can access host-based systems through some terminal emulators. You can also integrate Client Work Manager with Microsoft Outlook so you can read and send Outlook mail, and use the Calendar, Contacts, Journal, Notes, and Tasks categories directly from Client Work Manager.

A Client Work Manager can include a local printer, which can be used instead of the print server for reproducing images and other documents. The workstation uses standard Windows software for local printing. Therefore, you can use any printer supported by Windows as a local printer, without requiring additional hardware or software for local printing. You can also add any compatible scanner to the Client Work Manager.

For more details, see Section 5.

Specialized Workstations

Although you can use the Client Work Manager for any application, there are other versions of the workstation that are suited to specialized roles.

Workstation	Description
Browser-based Client Work Manager	Browser-based interface that provides Client Work Manager equivalent functions.
Document Management Workstation	The Document Management Workstation (DMWS) is an earlier technology application that provides the user with the full set of capabilities.
High Performance Workstation	The High Performance workstation (HPWS) is an earlier technology application that displays a desktop designed to make transaction processing and similar "heads-down" tasks more efficient; it provides a subset of the standard desktop features in a more streamlined interface.
Internet or Intranet Client	Using the Unisys Web Connector, you can develop an application that effectively allows any web browser to function as a workstation and communicate with the system. Web Connector components reside on a Microsoft Internet Information Server and utilize both the Microsoft Active Server Pages and the CAL OLE Automation Interface. The Unisys Web Access Kit provides out-of-the box view–only access to the system. Like Web Connector, Web Access Kit is built on Microsoft web technology and the CAL OLE Automation Interface.

Workstation	Description
Microsoft Outlook Client of Microsoft Exchange Server	Although not a true workstation because it lacks the ability to connect to a workset and retrieve workitems, an Outlook client of an Exchange server can introduce workitems into workflow and then track the workitem through workflow. In addition, users at other workstations can forward work to Outlook clients. These capabilities are provided through the Unisys Connector for Microsoft Exchange.
Custom Workstation	There are many integration options that allow the creation of custom workstations. These options include using ActiveX components, the CAL OLE Automation Interface, and the Client API.
View Client	The View Client provides read-only remote access for viewing workitems.

Connector for Siebel

Connector for Siebel integrates front-office Siebel Call Center operations with InfoImage back-office workflow processing. Efficient input, storage, retrieval, and workflow enhances the efficiency and responsiveness of Siebel users.

How Client Work Manager Users Use the Connector for Siebel

Documents are stored in the Unisys InfoImage system. Back office personnel use the Client Work Manager to cross-reference each document to Siebel business objects (Contacts, Accounts, Opportunities, and Service Agreements). An index form enables the user to look up and link each document to the related customer objects, and then route the document through the various worksteps. The integration interface is called the Unisys Index Assistant for Siebel.

Further gains in processing efficiency can be obtained if the document was preprinted with identifying information that Unisys M can automatically capture from custom barcodes, or from OCR or ICR integration, thus bypassing the manual indexing step.

How Siebel Users Use the Connector for Siebel

Connector for Siebel provides easy front-office access to customer documents for all CRM market segments through the Siebel Call Center. Connector for Siebel links Unisys e-Workflow and Imaging documents to Siebel Business Objects (Activities, Contacts, Accounts, Opportunities, and Service Agreements) using a simple pointer that enables the CSR to seamlessly view the documents associated with the activity. An icon that displays in their activity list signals the CSR that a document is associated with the activity.

At any time during the process, if the customer requests information, a CSR can immediately provide the customer with answers about the status of their contact, account, or agreement, improving customer service.

Component Summary

The Connector for Siebel includes five major components:

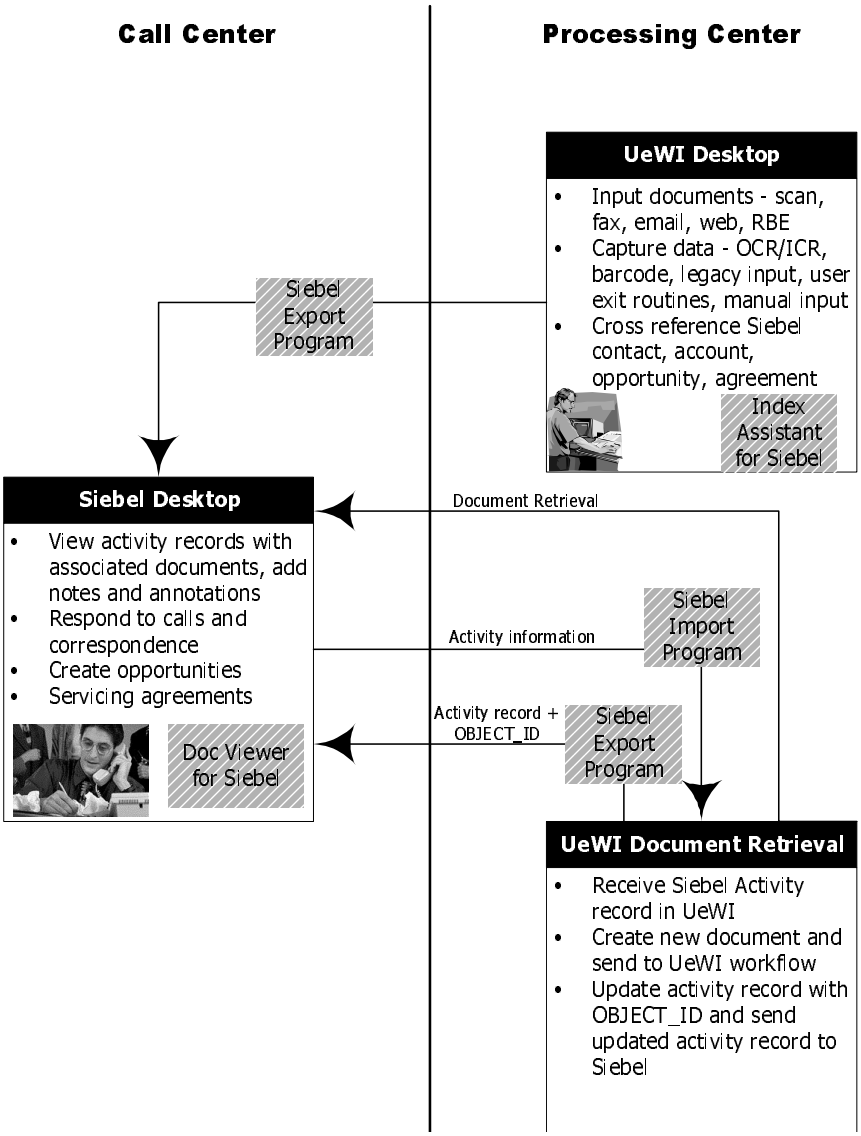
- Index Assistant for Siebel
- Siebel Export program
- Document Viewer for Siebel
- Siebel Import program
- Siebel Preferences

Other major components and sample files packaged with Connector for Siebel include:

- Siebel XML Reference Schema
- Siebel Import File (SIF)
- Siebel XML Template
- Unisys InfoImage and Siebel sample workflows
- Siebel CSR views
- Other sample files

Component Interaction Diagram

The interaction between Siebel and InfoImage components is illustrated below:



Index Assistant for Siebel

The Index Assistant for Siebel enables the Client Work Manager user to look up and match Siebel Business Objects (Contacts, Accounts, Opportunities, and Service Agreements) to Client Work Manager documents. An easy keyboard shortcut invokes a search for matching documents. With the Index Assistant for Siebel, the Client Work Manager user can seamlessly transfer data between the Unisys InfoImage index form and the Siebel screens, and query the Siebel database for related business objects.

Backoff logic

When you look up objects, Index Assistant applies intelligent search logic, called Backoff logic, to each of the four Siebel Business Objects. In addition to the Backoff logic, both Contact Last Name and Contact First Name for the Contact Business Object have "sounds like" search operation.

Customizable search logic

You can specify the Backoff order for each Siebel-related index field in the Siebel XML IAS Mapping Definitions File. Use the SearchOrder item to specify the index field to exclude during the Backoff query operation.

Siebel Export Program

The Siebel Export program, also called the XML Export Gateway Robot, transfers index form data from captured documents to the Siebel Call Center as a new Activity. New Activities are marked for action by a CSR who is using the Siebel client. Activities can be assigned to Siebel CSRs using one of the Siebel assignment methods.

The Siebel Export program periodically wakes and polls a Unisys e-Workflow & Imaging workstep, typically the Activity Export workstep, for documents queued for export to Siebel.

If there are documents in the queue, the program

- Converts the index form of each document and other default data, such as the date and time, to XML
- Transports the XML data to the EAI Siebel Adapter using the Siebel HTTP Transport and Web Engine
- Converts the XML data to a Siebel Activity record using EAI Siebel Adapter

Document Viewer for Siebel

The Document Viewer for Siebel enables the CSR to retrieve and view Unisys e-Workflow and Imaging documents related to an Activity. A document icon is displayed in the Siebel Activities list, whenever there are related documents. The icon is the same one used in the Client Work Manager interface to symbolize a document. Clicking the icon in the list applet, and clicking on View Doc button in the form applet produces the same result. It retrieves the document and opens the first page in the Document Viewer. Behind the scenes, this is accomplished using the Unisys e-Workflow and Imaging CAL component with its built-in document viewer. The CSR can then annotate or manipulate the page as needed.

Siebel Import Program

After the CSR modifies or creates an Activity record (to enter an item into the processing center workflow), the Siebel Import Program transfers data from a Siebel Activity record to Unisys e-Workflow and Imaging, and creates a shell document that will hold the documents related to the activity.

The Siebel Import Program sends a request to a specific URL. The Siebel Web Engine (SWE) then triggers a workflow that looks for Activity records flagged for Unisys e-Workflow and Imaging. The program retrieves the Siebel data, then converts the Activity record data to Siebel XML, transports the XML data to Unisys e-Workflow and Imaging using the HTTP Transport mechanism, and then converts the XML to a Unisys e-Workflow and Imaging document.

Siebel Preferences Program

Siebel Preferences enable you to

- Set the Unisys e-Workflow and Imaging user logon information for a workstation
- Enable the Index Assistant for Siebel
- Set the Siebel user logon information for a workstation
- Select the Siebel configuration file to use
- Set the path and file names for the mapping file
- Set the number of Document Viewer windows the user can open simultaneously

The Siebel Preferences information is stored in the Windows Registry.

Other Components

Siebel XML Reference Schema

The Siebel XML Reference Schema (Siebel XML Reference Schema.xml) is used to generate the XML Mapping Definitions files that are required by the Siebel Import and Export programs, and for the Index Assistant for Siebel.

Siebel Import File

The Siebel import file (Siebel Integration Objects.sif) contains the Business Component, Integration Object, applets, views, screens, and other information required to integrate Siebel Call Center with Unisys e-Workflow and Imaging.

Siebel XML Template

The Siebel XML Template contains the header information required to generate the XML Mapping Definitions file. Header information identifies

- The objects and fields to populate with the XML data
- The root attribute
- Illegal character conversion information

Siebel Views

Connector for Siebel provides several Siebel views.

- My Activities + Docs
- Contact List
- Account Detail – InfoImage Activities
- Contact Detail – InfoImage Activities
- Correspondence

Workflows

A sample InfoImage workflow (usiebel.rte) provides a basic processing flow to export and import data to and from Siebel Call Center, with placeholders and suggestions for further automation of an application processing center. You can use this sample route as is, or customize it to meet your site requirements. Two sample Siebel workflows are also provided, Activity Query and Activity Upsert. These workflows are included in the Siebel Import File (.SIF).

Other Sample Files

The sample files enable you to use the Connector for Siebel right out of the box. You can use these files as is, or you can customize the files to meet your site requirements. Samples include

- Desktop definition file
- Index and query forms
- XML Mapping files
- HTTP configuration file

Workflow Domain Subsystems

The Workflow Domain Subsystem provides direct services to the workstations, including the workflow support required for an image-enabled transaction processing system. The Workflow Domain Subsystem maintains both a cache of workitems in the workflow and the databases that contain information about each document and folder in the Workflow Domain.

The software running on the server manages the movement of workitems through the workflow and knows where to find each workitem. The Workflow Domain Subsystem acts as an intermediary when a workstation needs to obtain information from the Catalog or the archive. It also serves to insulate the workstations from details of the enterprise-wide image storage. Finally, the Workflow Domain Subsystem can provide electronic filing cabinets and image archive services for small systems. This ability allows small pilot systems to be implemented and later expanded to larger systems.

The Workflow Domain Subsystem software runs under the Windows operating system. Database services are provided through an Open DataBase Connectivity (ODBC)–compliant SQL database and a Windows ODBC driver, both of which have been certified to run with the system. For more information, see "Relational Databases."

Typical hardware for a server includes a Pentium computer with 128 MB or more of memory, at least 4 GB or more of disk storage, and a LAN adapter. The magnetic hard disk is often protected with RAID-5 technology and a magnetic tape drive for backup.

If servers are consolidated, a high-end server, such as the Unisys ES7000, is recommended.

Optional hardware and software that can be added to a Workflow Domain Subsystem (but are often installed on a dedicated server) include the Fax Manager and the Print Manager.

Stand-alone optical disk drives and optical disk jukeboxes can also be attached to Workflow Domain Subsystems for test and demonstration purposes.

Configuring the Archive Manager and a Workflow Domain Subsystem on the same host is not recommended or supported for production purposes, unless the Workflow Domain Subsystem and Archive Manager are consolidated onto a single high-end server.

Workflow Domain Subsystem Architecture

The Workflow Domain Subsystem software includes base processes and additional processes. The base processes are as follows:

- The Object Manager provides storage and management services for workitems resident at the Workflow Domain Subsystem.
- The Index Manager provides indexing services to support the File Cabinet.
- The Transfer Manager processes work on system worksteps, specifically, Archive, Delete, Transfer, and Request worksteps.
- The Route Engine handles the workflow on each server on the Workflow Domain, plus Workflow Domain load balancing and logon validation on the Workflow Domain Controller.

Other processes can be run on one or more servers:

- The Fax Manager provides fax-in and fax-out services.
- The Print Manager handles high-speed image printing.

An integrator can also write other Workflow Domain Subsystem programs that process workitems with or without user intervention. These programs are typically used to upload or download batch data, create documents or folders from external data and images, and manage the workitems in ways unique to a particular business application.

These programs are written with CAL, which is provided as part of the system software package. The programs run on the servers or on other computers on the LAN running Windows 98, NT, XP or Windows 2000/2003.

Workitems are stored as files in a directory on the server. The directory must be on a Windows NTFS.

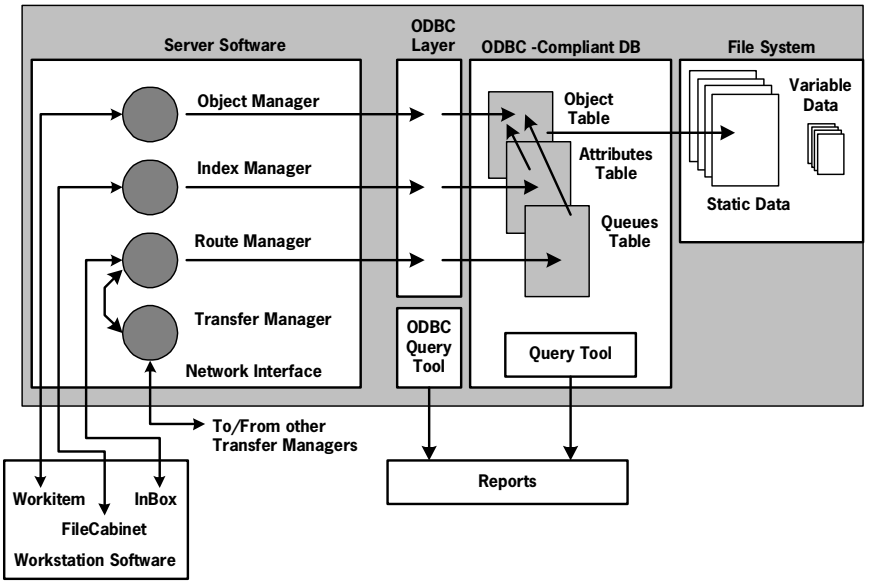
Relational Databases

The databases on the system servers contain several tables. Object Manager and Index Manager maintain these tables. Every server that stores workitems requires its own Object table. Every server that participates in workflow requires its own Queues table and Log table. The Log table lists every workflow transaction. The one server in a Workflow Domain that is running Index Manager requires its own ATTRIBUTES table. Ad hoc database reports can be created using either a utility that is installed with the database management system (DBMS) or a third-party application of your choice.

The workstation software does not have direct access to system databases. The workstation does not log on to the database. Instead, it communicates with the processes on the server. These processes, in turn, manipulate the database by acting as agents for the workstation software. That is, each server process "logs on" to the database.

Workstations indirectly affect the state of the database by making requests of the Workflow Domain Subsystems. The Workflow Domain Subsystems then perform all database tasks on behalf of the workstations. Because only the servers log on to the database (and not every workstation), there are very few "users" of the database. The net effect is a limit to the number of database users and improved performance. It also means the relational databases only need to support local access rather than remote access from a workstation. This does not mean that the databases in the system can be configured *not* to accept remote access.

The following illustration shows the Workflow Domain Subsystem processes and the Object, ATTRIBUTES, and Queues tables. The small arrows on these tables indicate that the references to workitems in both the ATTRIBUTES and Queues tables are stored in the Object table.



The system uses ODBC as the interface between the Workflow Domain Subsystem software and the relational database. This interface means that the choice of a specific vendor for the database software depends only on the availability of a properly qualified driver—not on whether the code has been ported to that platform. It also provides a means for remote access to databases on other computers running other operating systems.

The system uses any relational DBMS for which an ODBC driver is available under Windows. Currently, the Microsoft SQL Server, Sybase SQL Server, and Oracle Server for Windows NT and Windows 2000 are certified. Because of the effort required to create and test new drivers, do not assume that other database engines can easily replace these DBMSs. You will find a description of the principle tables in the following sections.

Object Table

Each Object table records information about workitems resident at that server. Object table columns include the ID, name, ownership information, workitem type, numerous status flags, and various dates (such as creation, last modification, and last reference). Another column indicates the number of times a document is Work In Progress (WIP).

Link Table

The Link table for WIP is used to record which WIP documents are contained within which WIP folders. This table enables Object Manager to determine all the folders in workflow that contain a given document. The Link table also holds information about the status of a WIP document within a WIP folder, such as whether it was opened for viewing at the current workstep.

ATTRIBUTES Table

The ATTRIBUTES table stores index information about all workitems in the Workflow Domain. This index information is used to search for workitems. The five standard columns of the ATTRIBUTES tables are the ID, the name, the type (document, folder, batch, or import), the name of the server on which the object resides, and the object class. The other columns are the union of all user-specified index fields. Columns that are not applicable for a given workitem are left as blank entries. For additional information, see "A Third-Party Application Providing Indexing Services" later in this section.

Only Index Manager has direct access to the ATTRIBUTES table. Index Manager uses the table to process File Cabinet queries from the workstation software.

Queues Table

The Queues table contains the workflow queues that Route Engine maintains. Generally, each row of the table is a workitem that is currently in workflow, either awaiting processing or WIP on a user's desktop. On occasion, request queue entries may refer to workitems that are not currently in the workflow or even resident on the Workflow Domain. In addition, mailbox entries may refer to workitems that are not in the workflow.

The table's columns include the name of the current workstep, ID, name, timestamps, status flags, assigned user, and an instance identifier. The instance identifier is used with the ID to uniquely identify each workitem and relate the workitem to its own specific custom workitem variables that are stored in the WFIVARS table.

There is one Queues table on each Workflow Domain Subsystem in a Workflow Domain and all the workitems in workflow on that server are in this table. Only Route Engine has direct access to the Queues table.

QVARS Table

The QVARS table contains the custom route and custom user variables that are created in the Workflow Designer tool. Generally, each row of the table is a variable that is currently defined for the route or for any one user defined in the system.

The table's columns include the name of the user associated with the variables if the variable is a user variable, a variable ID, and a value. For a description of these variables, see Section 3.

There is one QVARS table on the Workflow Domain Controller and all the route and user variables defined for the Workflow Domain are in this table. Only Route Engine has direct access to the QVARS table.

WFIVARS Table

The WFIVARS table contains the custom workitem variables that are created in the Workflow Designer tool. Each row in the table lists up to 30 custom workitem variables defined for each workitem in workflow. Custom workitem variables are used in workstep processing for routing and in worksets for sorting and selecting the work. For a description of these variables, see Section 3.

There is one WFIVARS table on each Workflow Domain Subsystem in a Workflow Domain and all the workitems in workflow on that server are in this table. Only Route Engine has direct access to the WFIVARS table.

Log Table

The Log table contains an audit trail of Route Engine activities. Each row of the table describes a Route Engine event: users logons and logoffs, and the movements of a workitem through workflow.

The information recorded for workflow events includes when a workitem is dequeued, locked, unlocked, routed, and put into error status.

The columns in the Log table include the name of the resource that requested the operation, the type of event, and the time the event occurred. If the event involves a workitem in workflow, the table also lists the name of the workstep involved, the number of the routing rule invoked, the values of custom workitem variables, and workset associated with the event.

This table is frequently used to produce custom reports about workflow activity. An SQL query can be run from the database front end to produce a report that can be formatted as required. A typical example of such a report is a trace of all the worksteps at which a document was processed, and the time it spent waiting at each workstep. Although this same data is available in each workitem's history, the Log table collects all this data in a single place.

There is one Log table on each Workflow Domain Subsystem in a Workflow Domain and all workflow logging is contained in these tables. Only Route Engine has direct access to the Log table.

Database Security

Database security is provided by the password protection of the database engine. Users at a workstation do not have access to the database. All users must log on to the system and the server software validates these logon IDs before granting the user access to the system.

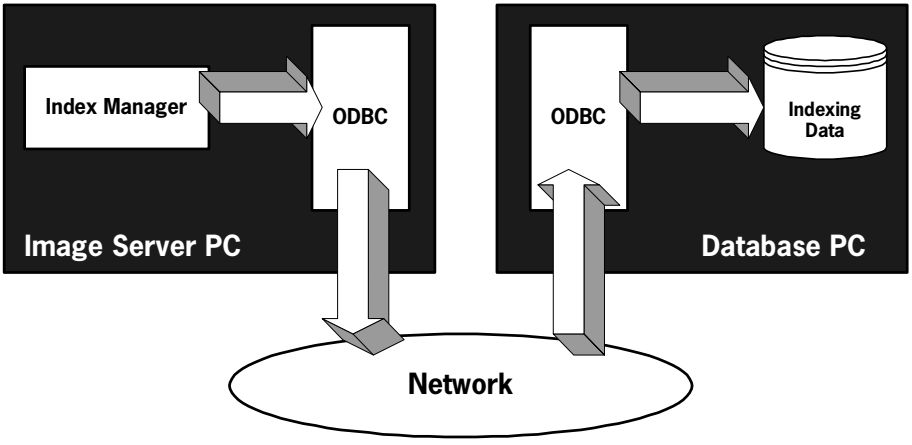
Remote Databases

Preferably, all Workflow Domain Subsystem databases are installed locally, with the database tables located on the same server as the InfoImage software that use them. Although remote databases are supported when sufficient reliability and performance of access are available. InfoImage usually has two environments where the databases are installed remotely on a separate server. These are:

- The Attributes table, by the Index Manager software.
- Catalog tables, used by the Location Manager software.

Locating these database tables remotely may be advantageous because they have the potential to grow very large.

The following illustration depicts the use of ODBC and a remote database.



Using a remote database is transparent to the software. ODBC drivers on a client of the database engine and the machine containing the actual database make the connection.

The system is highly dependent on database transactions, and special care must be taken when installing a remote database to ensure that system throughput is not impaired.

Workflow Domain Architecture

Because most of the services that a server provides can be shared across several computers, it is possible to spread workitems across separate computers and have each server provide the services for its own workitems.

The collection of these computers and the software that runs on them is known as a Workflow Domain. A single workflow specification is also shared, which means that all worksteps exist at every server in the Workflow Domain. One computer in the group must be designated as the Workflow Domain Controller.

In the InfoImage environment, there are two different types of domains: NT domains and InfoImage Workflow Domains. The NT domain controller, which runs Windows NT Server, authenticates NT domain logons and maintains the domain database. The InfoImage Workflow Domain Subsystem runs InfoImage software and acts as Workflow Domain Controller for participating InfoImage workstations.

All the servers in the Workflow Domain (with the possible exception of the Workflow Domain Controller) participate in the work of processing transactions and caching documents. The Workflow Domain Controller has added responsibilities, including the management of both logons and load balancing. It also maintains the MailBox queues for all users. Depending on the needs of the department, the Workflow Domain Controller may or may not be configured to participate in workflow.

This architecture provides the processing power to handle large departments with hundreds of workstations using off-the-shelf computer components. The servers all contain workitems for all the worksteps. Users can be redirected, transparently, to another server if work ceases to be available at the server currently supplying workitems. Therefore, even if a server fails, all users can continue working without interruption. Although work at the failed server is not available until it is brought back on-line, all users can continue to process their workitems.

Dynamic Load Balancing

If a single workflow is spread across multiple servers, all worksteps exist at every server. All servers are equally capable of providing workflow services, and the software can decide which server should supply work to each user. The user logs on to a Workflow Domain, not to a specific server, and the Workflow Domain Controller has the responsibility of keeping the user supplied with work from the most appropriate server. The user never knows from which server the work is being drawn.

In such a multi-server Workflow Domain, it is desirable to balance the amount of work being processed on each server. An equal number of workitems and an even transaction rate across the Workflow Domain help to maintain the ordering statements within a workset. Well balanced transaction rates provide all users in a Workflow Domain with approximately equal response times. Load balancing also reduces the chance of a server running out of work.

There are two ways in which the software maintains an approximately even level of work on all the servers.

- When work is released from a High-Volume Scanner (HVS), the HVS asks the Workflow Domain controller which server currently has the least work, and the batch of documents is directed to that server.
- The Workflow Domain Controller frequently determines the processing rates (in transactions per hour) for each workset on each server. When a user starts processing work from a workset, the Workflow Domain Controller assigns that user to the server with the lowest transaction rate. Periodically, as work is processed, the server rates are reevaluated and one or more users may be redirected to another server. This redirection is entirely transparent to the user.

The system administrator can adjust the balance of work on the servers.

Server Consolidation

A high-end server, a multi-processor server with a large number of CPUs, is used to consolidate many small servers that contain multiple Workflow Domain Subsystems, onto one server. Therefore, a customer can consolidate his many business departments onto one high-end server. The *Server Consolidator* is a utility that consolidates multiple individual servers on to one single high-end server, that is, it migrates the workitems (documents) from one server to another.

Index Server

Indexing can be managed in several different ways, depending on the answers to the following questions, as well as others.

- How many workitems are being stored in the ATTRIBUTES table at one time?
- Should workitem entries be retained in the ATTRIBUTES table when the workitems are deleted from the Workflow Domain?
- Is the indexing being handled through the system directly or through integration with a host-based application?
- Should the physical ATTRIBUTES table reside on a workstation, on the mainframe, or on some other computer?
- Can a client/server database be used for some indexing?

Some enterprises may want to provide several parallel indexing services. The options described in the following sections are not all mutually exclusive.

The software distinguishes between information provided from the ATTRIBUTES table and from the Catalog. Data in the Catalog resolves a workitem's name or ID into its address on a named platter and the jukebox to which that platter has been assigned. It also contains the name of the current Workflow Domain that has the right to lock the workitem for modification.

In contrast, the ATTRIBUTES tables provide indexing fields for retrieving a workitem by its data values as well as the location (the name of the server in the Workflow Domain) on which the workitem currently resides.

The simplest indexing options provide indexing services for each Workflow Domain through an index server running standard out-of-the-box software on a workstation. Those configurations are described in the "An Index Manager for the Workflow Domain" section. Other approaches are described as variants to these basic plans in the "A Third-Party Application Providing Indexing Services" section.

An Index Manager for the Workflow Domain

The Index Manager within the Workflow Domain can maintain a local ATTRIBUTES table if there is only one Workflow Domain, or if all users in an enterprise have the need to search by index values for only the workitems in their own Workflow Domain. The Attribute table is usually in a database residing on the same computer as the index server software, but it may be on another computer with ODBC drivers making the connection.

The Index Manager generates a report that lists which workitems match the specified values in a query form. When you enter values for one or more fields and ask for a search, Index Manager translates the supplied data into an SQL query that is applied to the ATTRIBUTES table. The result is a list of matching workitems from which the user can choose to retrieve one or more of the rows. Each class of documents and folders can define its own set of index data.

There can be only one index server with one ATTRIBUTES table in a Workflow Domain. In a small Workflow Domain, Index Manager can run on the same computer as one of the Workflow Domain Subsystems; in larger Workflow Domains, it should run on its own computer.

Even though a Workflow Domain restricts its indexing information to its own workitems, you can retrieve a document or folder in another Workflow Domain from information in the Catalog or you can use enterprise indexing to query all the Workflow Domains in the enterprise.

For each class of workitems, Index Manager can be configured to supply indexing services only for workitems currently in its Workflow Domain or to maintain indexing data after the workitems are deleted from the Workflow Domain. Index Manager either deletes the row from the database table when a workitem is deleted from the Workflow Domain or leaves it in the table but changes its server name to ARCHIVE. If the table entry is deleted along with the workitem, you can only search the archive by name, but the size of the ATTRIBUTES table remains smaller. For applications that need to search the archive by index values for a very large list of workitems, the database can be moved to a more powerful computer or an external database can provide this functionality.

A Third-Party Application Providing Indexing Services

In an organization where there is an existing database for a third-party application that is being integrated with the system, that database can provide indexing services by storing the workitem's ID as its document locator number.

For example, if a user is communicating with the mainframe through a 3270 terminal emulation window, the host software can respond to an index request and then instruct the software to retrieve the document from archive, print it, or take other appropriate action.

In a tightly integrated desktop, the designer of the user interface may provide controls that initiate an index lookup in the mainframe or other external database and then open the requested document at the workstation.

For some applications, information relating to workitems may be stored in a LAN-based database outside the system.

The Index Manager is still required because its database table maintains the name of the server on which a workitem resides. This table may or may not contain columns of indexing fields. If it does, then queries that use those fields can be initiated from the File Cabinet tool. As always, you can retrieve documents by name through the File Cabinet tool.

Catalog

The Catalog is a single centralized resource responsible for keeping track of the physical addresses of all archived workitems. Each workitem has a location record that maps its ID and name to a physical address made up of archive location and optical platter location (volume, sector, and offset). Thus, to retrieve a workitem from an archive, the server first searches for it in the Catalog. Then, using the returned information about the physical address, the server issues a retrieval command to the appropriate archive.

The Catalog keeps track of multiple copies of a single workitem. There are addresses for the working copy and the backup copy. Within each copy, there are separate files for both the static component and the variable component of the workitem. When both the working copy and its backup are in jukeboxes, the server can retrieve the workitem from either archive.

The relational version runs under Microsoft Windows using one of these database management systems: Microsoft SQL Server, Sybase SQL Server, or Oracle Server for Windows.

Migration tools are available for organizations whose needs change and decide to move data from one type of Catalog to another (mainframe to relational or relational to mainframe). Moving a relational Catalog from one certified DBMS to another is supported via tools in the DBMS.

After Server Consolidation, there is one CATALOG for each Enterprise within the server (such as ES7000).

High-Volume Scanner

The High-Volume Scanner (HVS) provides "industrial strength" paper processing to convert paper documents into electronic images. The system supports Kodak's latest line of scanners, the Digital Science document scanners, and Kodak's older Imagelink line of scanners. The duplex versions of these models provide double-sided scanning.

They all support the following automatic services:

- Document feed.
- Imprinting of control numbers on pages.
- Overlap detection.
- Skew detection.

An HVS includes one of the Kodak scanners and a Pentium computer operating under Windows with 128 MB of memory, a 1-GB hard disk, a LAN adapter, and a SCSI adapter.

The HVS software includes barcode recognition for the 3-of-9 and interleaved 2-of-5 coding schemes. You can use the barcoded information to identify the document type (allowing multiple document types in a single batch) or it can be interpreted and added as coded data to the document's form data for use in a later processing step. You can add other data values to all the documents in a given class and you can change these values at the HVS at any time.

The three types of barcodes that are permitted are described in the following table.

Barcode	Description
Page level	Applies only to the page that contains them.
Document level	Applies to the entire document.
Persistent	Applies to all documents scanned until a new page of persistent barcodes is recognized.

The HVS also supports micrographics patches for automatic document assembly. These patches can, for example, indicate the start of each new document within the stack of paper.

You can direct the HVS to create up to three partial images, in addition to the full-page image—all from a single pass. These rectangular subsets of the full image become separate pages within the document. You can use these subsets to extract a consistently located region of a page (such as a signature block or address field), or to break a large-format sheet into smaller images.

A quality control viewer in the HVS software permits the user to see a reduced image of each page as it is scanned, or a subset of them. This feature provides immediate feedback if the scanner station fails to capture the image.

HVS Image Viewer

The Image Viewer is used by the HVS operator to view the scanned images and perform quality control on the images being scanned. The Image Viewer is designed to support TIFF images scanned by the HVS and does not support any other image formats. Users can configure the HVS to view every scanned image or just the first image of each document, one page at a time.

Image Viewer Dialog Box

Using the Image Viewer dialog box, the user can choose the View command and perform general viewing functions such as image reduction, enlargement, and rotation. The following table describes several enhanced View menu commands.

Command	Description
Fit Page Width to Window	Scales the image to fit within the width of the window.
Scale by Percentage	Displays a dialog box used to scale the image in increments of 10 from 10% to 100%.
Undo Rotations	Allows the user to undo a rotation performed on an image and return it to its normal view.
Emphasize Black	Preserves more black pixels on the image when it is scaled down.
Image Information	Displays a dialog box that contains information about the current image including the image width and height, the image DPI, the file size, etc.

For complete information on using the Image Viewer dialog box, see the *Imaging High-Volume Scanner User's Guide.*

Scan Manager

Scan Manager is an application that works with a desktop or mid-range scanner. Scan Manager is used for scanning documents into batches, assembling the batches, performing the required batch tasks, including quality control and indexing, and then sending the batches into workflow.

Scan Manager consists of two main user interfaces that are used for performing image scanning and batch tasks. The two interfaces enable multiple users to complete batch tasks. For example, one user uses the Scan Manager interface to scan documents into a batch using a scanner workstation; another user uses the Batch Viewer interface to perform quality check and indexing on the batch and then send the document into workflow once all required tasks are complete.

Scan Manager Interface

The Scan Manager interface works with a workstation scanner to scan image documents and assemble the documents into batches. The interface provides many options to automate the scanning and assembly process. For example, a user can select options to automatically separate batch documents while scanning, or select other options that require operator input to determine when a new document or batch begins or ends. The user can choose whether to manually check for quality while scanning, or postpone the quality check to a later time.

Program options enable the communication with InfoImage Workflow Domain information. Using the Workflow Domain information, Workflow Domains and document classes can be assigned to batches for indexing, adding overlay forms when drop-out ink is detected, and document naming.

The following list provides some of the available options in the Scan Manager interface:

- Default or manual naming of document and batches
- Automatic or manual assembly
- Use of Micrographic patch codes for separation
- Use of barcodes for separation and indexing
- Image enhancements
- Output options
- Duplex scanning
- Quality control checking while scanning
- Indexing while scanning
- Detection of drop-out forms

Scan Manager Editions

There are two editions of Scan Manager available, Basic and Professional. The following table indicates the options available for each edition.

Scan Manager Edition	Patch & Barcode Recognition	Blank Page Detection	Image Enhancements	Output Options	Full Barcode Recognition
Basic	● (limited)	●		● (limited)	
Professional	●	●	●	●	●

The Scan Manager Basic Edition is provided with Client Work Manager.

The Batch Viewer Interface

The Batch Viewer interface can run on any workstation in a Workflow Domain. The interface provides batch maintenance functions used for finishing the tasks required before sending a batch to workflow.

Using the Batch Viewer interface, you can view an entire batch of documents. The necessary quality, indexing, and other preparation tasks can be completed and batches can be sent into workflow.

The following list provides some of the tasks that can be performed using the Batch Viewer interface:

- View batch, document, page properties, and batch statistics
- Check quality, and re-scan bad pages
- Index documents and pages, or perform automatic indexing.
- Enhance images
- Insert missing pages, split and merge batches
- Create batch, document, and page notes
- Define output destinations (such as workflow, printer, fax, email), and send batches to output.
- Display first page of a document, even when no image pages were defined for the form.

XML Gateway

XML Gateway offers an e-business solution that enables other business systems to communicate with InfoImage through XML documents. With XML Gateway, XML documents can be introduced to InfoImage for processing through its workflow and imaging system just as printed or scanned documents are introduced. Additionally, XML Gateway offers the ability to export data from InfoImage to other business systems as XML documents.

XML Gateway includes three components that work together to provide an end-to-end e-business solution using XML:

- A configuration and design-time component (the XML Gateway user interface)
- XML Import Gateway component
- XML Export Gateway component

Configuration and Design-Time Component

The XML Gateway user interface enables the system administrator to set up the rules for how XML data will be automatically mapped to InfoImage forms and to TIFF images for XML import and/or export. These rules, or Field Maps, define the relationship between XML tags and InfoImage form fields, and between XML tags and zones on a TIFF image. After implementation, XML Gateway uses these rules to parse incoming XML data and push it to RBE, and to construct outgoing XML documents.

The configuration component is implemented as a snap-in module to the InfoImage Central Administration Console (CAC). Users already familiar with the model and with the CAC user interface will find the XML Gateway user interface follows the same standards and behavior.

XML Import Gateway

The XML Import Gateway uses the mapping relationships created in XML Gateway's configuration component to parse XML documents arriving from an external system. During import, the XML Import Gateway:

- Accepts XML data arriving from the network in the form of HTTP messages, MSMQ public queue messages, and files.
- Associates each XML message or file with an InfoImage form to create an eForm document. As a configuration option, the original XML document can be stored in a text file as an attachment to the eForm.
- Produces an image either by using an XSL style sheet or overlay rules, or by rendering the XML document to a tree structure. The resulting image can then be routed through workflow. Optionally, the user can specify no image rendering for a specific XML document type.
- Introduces the eForm documents into the business workflow process and/or into archive using the Rapid Batch Entry (RBE) service. Once the files are sent to RBE, they are processed and introduced to InfoImage workflow, where they can be viewed using CWM, iCWM, DMWS, View Client, or Web Connector, and can be routed, printed, faxed, and archived. Document indexing occurs as part of RBE processing.

This component, independently or with the XML Export Gateway component, provides a method for exchanging data with external application systems using industry standard data representation and transport protocols.

XML Export Gateway

The XML Export Gateway transfers index form data from InfoImage-captured documents to the external system. The XML data stream is transported to the external system via the internet/intranet using the HTTP protocol or as an XML output file. The delivery method is determined when the XML Export Gateway Robot is configured through InfoImage Robot Manager.

XML export data mapping involves:

- Identifying the destination fields associated with the output data.
- Providing default output values for destination fields with no source data. These can be literals or the values of exposed program variables.

The XML Export Gateway runs as a background robot, configured through InfoImage Robot Manager.

Archive

The Archive Manager consists of a Pentium computer with 64 MB of memory, a 2 GB or larger hard disk, a LAN adapter, and a SCSI adapter attached to an optical jukebox or stand-alone drive.

The Archive Manager runs under Windows 2000 and Windows NT operating systems. It is responsible for storing and retrieving workitems to and from an optical disk jukebox or a stand-alone optical disk drive. The Archive Manager is aware of which volumes are stored in its jukebox and of the volume's status (mounted or unmounted). The archive communicates with Workflow Domain Subsystems and the Catalog using TCP/IP.

Supported jukeboxes include models by Hewlett-Packard, Kodak, Plasmon, and Phillips-LMS. These jukeboxes can be configured with on-line storage ranging from 42 GB to almost two terabytes per jukebox.

As an alternative to Archive Manager, Storage Manager provides the ability to store workitems on an NTFS file system and retrieve them on demand, using standard Windows commands.

Enterprise Locking and Visibility

The Enterprise Locking feature prohibits concurrent modification of a workitem by multiple Workflow Domains. Before a Workflow Domain can modify a workitem, it must first secure an Enterprise Lock. This lock prevents other Workflow Domains from modifying the workitem.

The Enterprise Visibility prior to archiving feature allows every Workflow Domain in an enterprise to query and retrieve workitems from other Workflow Domains, even if the workitems have not been archived. The Locking feature must be enabled before enabling the Visibility feature.

Another feature, Interdomain Transfer, is used in conjunction with the Visibility feature. It provides the capability of transferring modified workitems between Workflow Domains even if they have not been archived. For additional information on Enterprise Locking, Visibility, and Interdomain Transfer, see the *System Internals Guide*.

Enterprise Visibility can be enabled when the objects are first created or when they are saved. In general, the Enterprise Visibility process begins when the Workflow Domain Subsystem requests that Catalog records be created at the same time the workitems are indexed in the Workflow Domain. Then, records are created for workitems in classes *requiring archiving* and in classes *not requiring archiving*.

The Index Manager handles the visibility of items within a Workflow Domain. When the Index Manager receives new or updated information about workitems, it passes that information along to the Location Manager. Location Manager provides connectivity to the Relational Catalog where the Catalog resides.

Processing considerations for unnamed, renamed, and rescanned workitems are described in the following table:

Workitem	Consideration
Unnamed	For applications that can create workitems without naming them. The Catalog record is not immediately created. It is created later, when the workitem is named.
Renamed	For workitems that are currently named, renaming is allowed if the new name is not already in use.
Rescanned	For the Relational Catalog, duplicate names are allowed and a new record is created in the Catalog.

After the workitem Catalog entries are created, queries against the Catalog will return information about all workitems within the enterprise. If the system fails to retrieve a workitem from a different Workflow Domain, an error message appears in the log indicating the Workflow Domain.

Enterprise Indexing

An InfoImage environment can consist of multiple Workflow Domains, each of which stores a multitude of documents. Each Workflow Domain operates relatively independently of any other Workflow Domain. Initially, without a bridge between them, users in one Workflow Domain could not initiate a query for documents in another Workflow Domain.

Taking advantage of the enterprise-wide Catalog (created to store the location of documents on off-line storage), Enterprise Visibility was implemented to bridge the gap between Workflow Domains. With Enterprise Visibility enabled, users can query documents across Workflow Domains by specifying the document's name or identifying number.

At times, a user may need to initiate a query without knowing the document's name or identifier. In such cases, the user may query specifying certain application-specific values in *index fields* as the search criteria. With Enterprise Indexing, the user can query the both the Workflow Domain and the enterprise in this manner.

Enterprise Indexing enables you to perform index queries against other Workflow Domain resources, review the query set result, select documents from the results, and retrieve those documents.

Accessing Enterprise-wide Data

Enterprise Indexing accesses the existing data in multiple Workflow Domains by using *parallel distributed queries* (PDQ). This technology permits each database in the enterprise to be accessed using a single query. PDQ accesses multiple databases concurrently, returning a single result set to the user.

The heart of the PDQ is the Enterprise Query Manager (EQM). When presented with an Enterprise Query request, the EQM determines the validity of the query. It initiates multiple Enterprise Query Agents (EQA) to perform parallel database queries to the appropriate Index Servers and waits for and aggregates the results. It then returns the resulting information in a standard format.

Each EQA queries its associated Index Server only if it can produce the requested information. If an Index Server is unavailable, it is skipped and the other Index Servers will be queried normally.

To configure the system for Enterprise Indexing, refer to the *Installation & Configuration Guide*. The section on Enterprise Indexing describes the keys that need to be defined and enabled.

The system administrator will need to define a query form with the scope set to Enterprise or update existing query forms to include the value of Enterprise in the Scope field and select that value when performing the search. Consult the *Help for Forms Creator* for more information on Query forms.

After the form has been created, go to the File Cabinet on the Client Work Manager and initiate the query via the enterprise form. For more information, refer to the *Client Work Manager User's Guide*.

Enterprise Licensing

With Unisys Enterprise Licensing, an administrator can manage the number of client and server licenses in use in accordance with licensing agreements.

Enterprise Licensing identifies the following statistics:

- Number of registered client licenses
- Servers' maximum concurrent usage
- Authorized limits
- Number of licenses needed to comply with purchased client and server limits.

Administrators can maintain a history of these statistics and use this information to help prepare for future upgrades.

Request Manager

The Request Manager is an optional component that supports the processing of retrieval requests to a pool of Archive Managers. When a request is received, whether from a workstation or from a remote request, Request Manager sorts and prioritizes the pending tasks to achieve improvements in throughput at the Archive Manager. Specifically, it attempts to reduce the number of platter swaps within the jukebox and the number of imports and exports of platters (instead of handling the tasks using the FIFO queuing technique).

Using Request Manager to sort retrievals enables asynchronous processing of requests. That is, when you make a retrieval request, you can continue with other work.

This software will attempt to keep the average wait time short, but may delay any given request to keep the overall average of such delays at a minimum.

Request Manager maintains volume status information in two database tables. The Request table contains all outstanding requests for retrievals. The Volume table identifies the location of each platter in each jukebox. These tables provide information for reports created by running predefined SQL queries. You can use an automatically generated log file to obtain statistical information, such as the number of requests for each platter.

The Request Manager software runs under the Windows NT and Windows 2000 operating systems. The hardware is typically a Pentium computer with 64 MB of memory and a 2-GB hard disk. It requires an ODBC-compliant DBMS that has been qualified to work with the system such as Microsoft SQL Server, Oracle Server, or Sybase SQL Server.

Request Manager is not required for systems that use Storage Manager to archive their workitems.

Location Manager

Program access to the Catalog software is controlled through a process called Location Manager. This program manages requests for information about records in the Catalog for all the servers and workstations in a Workflow Domain. Two examples of this program in action are when File Cabinet queries are sent to the archive and when Object Manager determines whether a workitem's changes are archived before deleting the workitem from the Workflow Domain. For the Relational Catalog, Location Manager can run on any computer that has ODBC access to the Catalog database.

Print Manager

The Print Manager provides a printer dedicated to image printing. The Print Manager consists of a computer running under Windows NT or Windows 2000, and Hewlett-Packard LaserJet or Windows compatible printer.

When you make a request to print a document, a spooled copy of the document is added to the print queue for the specified printer. The Print Manager periodically looks for work on this queue. When it finds work there, the software retrieves the document and decompresses and prints it.

When printing from a workstation, it is not necessary to use the Print Manager. You can also print by sending the document to a local printer or to a shared network printer.

Fax Manager

The Fax Manager supports both fax in and fax out of image documents. The Fax Manager software uses a GammaFax CP card and is installed in a Workflow Workflow Domain subsystem or a separate fax server. The card includes its own intelligent processor that off-loads much of the work from the server. A maximum of four cards can be installed on a single computer.

When the Fax Manager software receives a document from a telephone transmission, it converts the incoming TIFF files with Group III compression into TIFF files with Group IV compression. The pages are then grouped into a document and released to a pre-assigned workstep.

Certain standard fields can be loaded automatically into the document's form data:

- A timestamp at the time of receipt.
- The port number at which the fax entered.
- A prefix that is configurable for each fax server.
- The Customer Subscriber Identification Number (CSID).

This last item is defined at the sender's computer and transmitted with the images; it is usually the sender's telephone number, but can be changed to any value of up to 20 digits.

When you fax a document, a spooled copy of the document is added to the fax queue. The fax server periodically looks for work on that queue. When it finds work there, the software converts the images to Group III compression and sends them across a telephone line. At the other end of the line can be either a fax computer that is printing to paper or any computer with a fax card, such as another Fax Manager.

When faxing from a workstation, it is not necessary to use the fax server. You can also initiate the transmission by sending the document to a local fax card, or to a shared network fax facility (a LAN-based redirection managed by the network requester).

Fax Cover Sheets

Those users who perform tasks using the Client Work Manager have the ability to include a fax cover sheet. The sheet prints a default graphic that is provided with the software. This graphic can be customized to display a company logo or other symbolic graphic. The graphic is a TIFF file stored on the fax server.

The user can enter optional "To," "From," and "Subject" information. This information prints on the cover sheet over the graphic image. The fax date, number of sheets, request, and destination phone number are automatically printed on the cover sheet.

You can also use CAL applications to submit a fax request for a document. Fax cover sheets can be included in fax jobs initiated by these CAL applications.

Contents Report

The fax server also generates information concerning failed fax-out jobs. This information appears in the Contents report, which includes a description of the error and the user ID. Fax Manager processing maintains fax-out requests in the fax workstep until the requests are successfully faxed or manually released by the administrator.

The status values of workitems change at different processing stages. The workitems status values include the following:

Queued	Workitem is awaiting submission to the GammaFax queue for fax processing
Held	Workitem is submitted to the GammaFax queue for fax processing
Error	An error occurred during fax processing
Printfax	GammaFax processing completed successfully

Optical Character Recognition Services

There are a number of third-party Optical Character Recognition (OCR) solutions that can be integrated into the system using CAL. These products that take advantage in the latest advances in recognition technology. Contact your technical representative for more information.

Adding Custom Processes

Most server processes are written as polling processes that function as clients of the base server processes. For example, the Fax Manager is implemented as a client process. It polls for and retrieves tasks from its system queue. Upon receiving a task, it calls the Object Manager to retrieve the appropriate objects. After performing its work, the Fax Manager notifies Route Engine that the task has been completed. Similarly, when a fax is received at the server, the Fax Manager uses Object Manager to add the fax to the database, and Route Engine to post the fax for processing.

Other server processes, such as the Print Manager and Transfer Manager, are all implemented similarly. There are system queues from which these processes draw work. Work is placed on the queue according to the user-defined workflows created with the Workflow Designer tool.

Additionally, user-written processes can interact with workitems in workflow by writing programs that call these same services. In most cases, this is done with the CAL OLE Automation Interface.

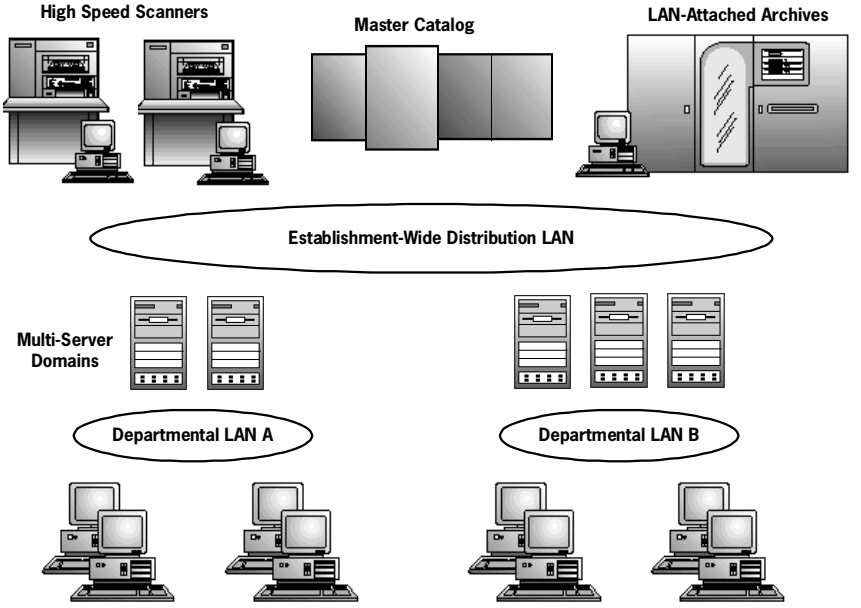
Typical examples of custom processes are the following:

- A program that reformats and batches coded data for submission to a mainframe-based transaction processing system.
- A program that uses barcoded information to look up and retrieve information from a mainframe customer file prior to presenting a document for processing by a customer service operator.
- A program that finds the customer folder for each incoming invoice and files that invoice in the folder.

LAN Architecture

The system can have a two-tiered LAN architecture. A department-level tier links workstations and servers in a client/server relationship. An establishment-level tier links servers, archives, high-speed scanners, and the Catalog in a peer-to-peer network. For applications where all the network traffic fits easily within the bandwidth of a single LAN, these two tiers can be collapsed into a single network.

Workstations communicate with the servers using TCP/ IP. Communication between servers is done using either TCP/IP or Advanced Program-to-Program Communications (APPC) as in the following illustration.



Workstation-to-Server Connectivity

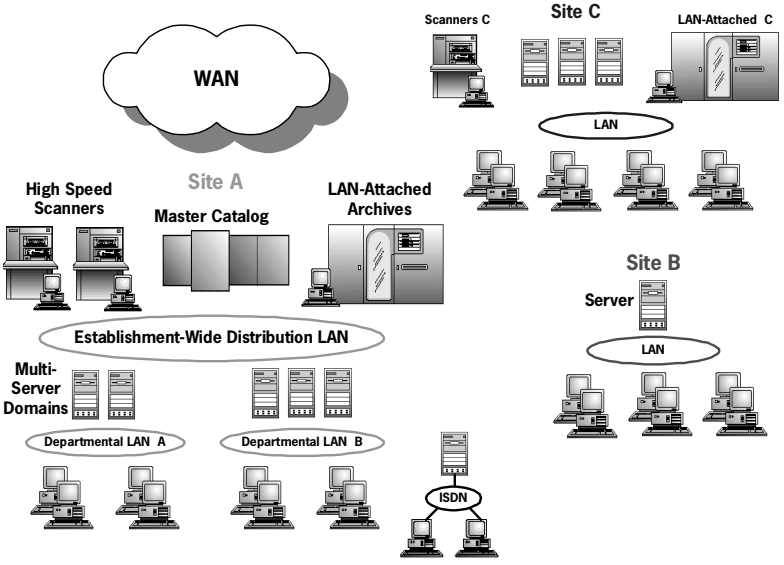
With *workstation-to-server connectivity*, the workstation software communicates only with the servers. They are linked in a departmental LAN to servers that provide access to the other components such as the archives, print servers, and Catalog. Workstations use TCP/IP for communications.

Workstations maintain a client/server relationship with the servers. The workstation initiates all sessions. Client Work Manager uses the CAL OLE Automation Interface to connect to servers.

A workstation must be able to communicate with all servers in a single Workflow Domain. In general, a single Workflow Domain should support all the workstations at a site that share the same pool of workitems. As the number of workstations in a Workflow Domain grows, extra capacity can be added to the Workflow Domain by adding one or more additional servers.

Server-to-Server Connectivity

With *server-to-server connectivity*, servers communicate with each other in a peer-to-peer network. An implicit assumption is that any server can communicate with any other server. The servers can use TCP/IP or APPC to communicate.



Wide Area Networking Architecture

The dynamics of Wide Area Networks impose certain design constraints. WAN characteristics differ significantly from LANs. A robust WAN protocol should

- Limit the amount of broadcast traffic traversing the WAN.
- Provide congestion control.

TCP/IP

TCP/IP was designed as an internet working protocol capable of connecting media of different throughput and delay and, therefore, it is an excellent choice for WAN connectivity. Placing routers on both sides of the WAN keeps broadcast traffic from the end nodes off the WAN. TCP/IP includes congestion control that permits cooperative bandwidth sharing as the network load increases. While individual connections may experience low throughput, aggregate throughput remains high. The system includes a native TCP/IP protocol implementation.

APPC

An alternate approach is based on the use of APPC. An APPC conversation can be routed transparently (to the application) by VTAM over an SNA network. Large installations often have remote sites connected with an SNA network. If the LANs at each site are attached to the SNA network and the appropriate node names are defined to VTAM, then the existing SNA network already forms a WAN that links the sites.

Network Operating Systems and Databases

The system requires Windows NT as the network operating system. The various servers communicate using TCP/ IP or APPC, depending on how the system is configured; the workstations and the servers communicate using TCP/IP.

The network operating system is used to provide shared security, disk storage, and printers in an installation. In such an implementation, workstations communicate with at least two servers, one being a shared network server, the other being a Workflow Domain Subsystem. A redirector is installed at the workstation if access to a shared server is required.

No database requestor is needed at the workstations. All access to information stored in the server databases is managed by the server processes. The workstation never communicates directly with these database engines.

Unified Logon

The Unified Logon Facility feature uses the Windows network operating system to eliminate the redundancy of entering logon information for both Windows and the system. It takes advantage of the Windows security features. When unified logon is enabled, clients begin by logging on to a Windows domain. The information obtained during that logon is used to verify the user's logon rights to the system.

Two-Tiered Architecture

The workstations communicate directly with the Workflow Domain server only, never with the HVSs or archives. Therefore, the LAN that ties the workstations to the Workflow Domain can be (but does not have to be) separate from the LAN that ties the Workflow Domain to enterprise-wide services such as high-speed scanners, jukeboxes, and the Catalog. The independence of the departmental LAN from the enterprise-wide LAN means that, in installations where the combined traffic might be too great for a single network, the addition of a second LAN reduces the data flow on each ring.

A second advantage to this architecture is the separation of failure points. If the enterprise-wide LAN fails, scanning and archive services are disrupted, but users can continue to process work that is resident on the servers. If the department LAN fails, users in that department, of course, cannot receive workitems, but scanning and archiving can continue, and other departments on separate LANs are unaffected.

Section 3
Workflow

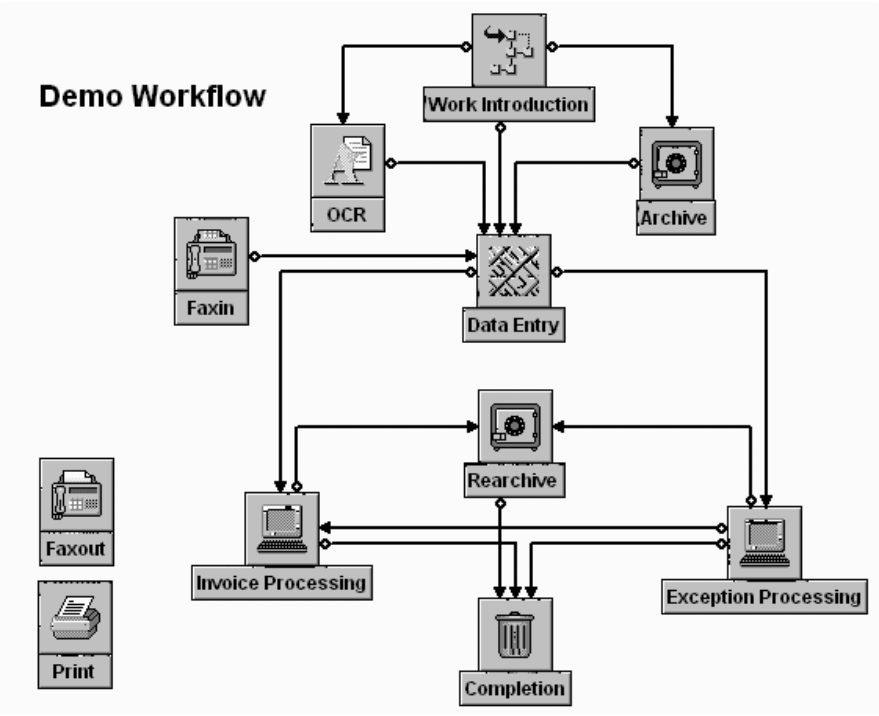
This section describes how worksteps, connections, rules, and statements are combined to form a route that regulates the behavior of workitems in workflow.

Overview

Workflow is the movement of work under program control from workstep to workstep. The collection of worksteps, connections, rules, and statements that define the behavior of workitems is known as a route.

The rules by which workitems move between the worksteps and some of the actions that take place at the worksteps are defined with a tool called Workflow Designer. For detailed information about this tool and its user interface, see the section entitled "Design Tools."

The following illustration shows a simple route with worksteps that was built using Workflow Designer.

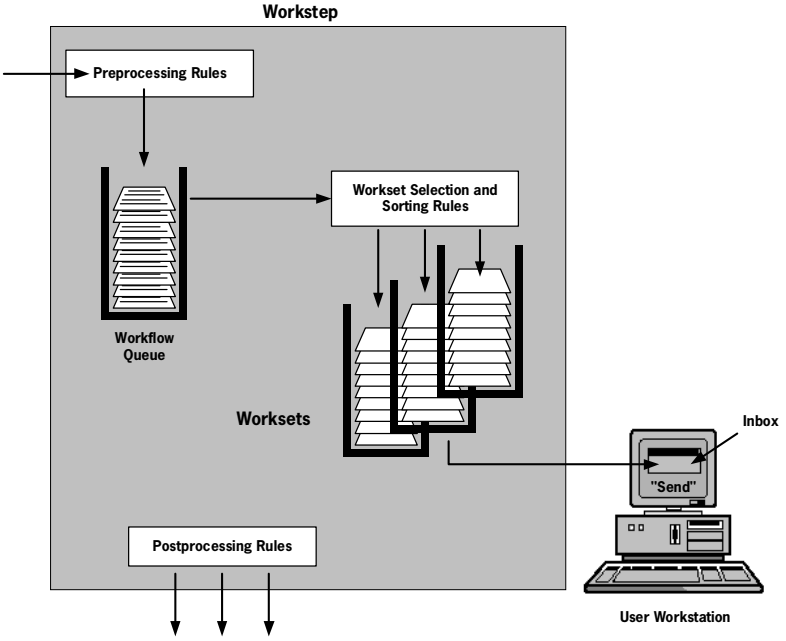


Workstep Processing

All processing of workitems takes place within worksteps. The events that affect a workitem are divided into three sequential stages within a workstep:

1. Pre-processing stage
2. Activity processing stage
3. Post-processing stage

Not all types of worksteps have all three stages, but any stages that are present occur in this order. The following illustration shows the order of events in the processing of a workitem at a workstep. Subsequent sections describe the details of these events.



In the pre-processing and post-processing stages, the designer of the route can specify several conditional actions that might take place for any given workitem, based on the current value of data in the form, in variables, or in a return value of a workflow script.

Workstep Types

There are many types of worksteps that can be defined with Workflow Designer. Every workstep belongs to one of the following classifications.

Workstep	Description
Custom	Worksteps are where a user at a workstation can draw work. The route does not define the specific kind of processing that is performed at the custom workstep, although the workstep name specified by the designer may indicate the type of processing performed by users, such as "Claims Analysis" or "Payables Verification." An automated function draws work from a custom workstep. For example, a program might look up a customer record based on a customer number that a user entered earlier in the route. The program will fill in the address and credit limit. Later, the users who view the document's data, after that workstep, see a complete customer record.
System	Those worksteps at which the system performs predefined activities. No user ever draws work from one of these steps. For a list of the types of system worksteps, together with a description of the processing that occurs there, see "System Worksteps."

System Worksteps

Several different processes manage the work that arrives at system worksteps. The name of the processes that draw work from each workstep is listed in the Managing Process column in the following table.

Workstep Type	Activity Performed	Managing Process
Archive	Sending workitems to the Archive Manager for archiving.	Transfer Manager
Delete	Removing workitems from workflow and deleting them from the Workflow Domain.	Transfer Manager
Fax	Faxing workitems out of the system using the Fax Manager.	Fax Manager
Join	Joining together parallel instances of workitems that were created at the Split workstep.	Route Engine
OCR	OCR processing of images in workitems.	OCR Manager
Print	Printing of workitems.	Print Manager

Workstep Type	Activity Performed	Managing Process
Program	Processing of workitems using custom code supplied by an application integrator. The activity processing is the actual execution of a specified user-defined Dynamic Link Library (DLL) that operates on the workitem. The principal difference between a Program workstep and an automated process drawing workitems from a custom workstep is that the custom code for a Program workstep is supplied as a DLL; for a custom workstep, it is supplied as a stand-alone executable program.	Transfer Manager
Rendezvous	Holding the incoming workitem until all related workitems are received (or until the wait interval expires); these related workitems are filed in a folder and routed.	Rendezvous Manager
Split	Splitting workitems into parallel instances.	Route Engine
Transfer	Transferring workitems to another Workflow Domain.	Transfer Manager
Work Introduction	Committing the batch of documents and introducing its documents (or a folder containing its documents) into workflow.	Object Manager

Users and Processing Work

At any workstep where resources (either a user or an automated function called a robot) process workitems, there are usually workitems awaiting processing. The list of all such items is a *queue*. Associated with each queue is a collection of rules that select and sort work into ordered subsets known as *worksets*. A user does not draw work from the queue directly, but from a workset. These workitems are presented to the user in a desktop tool known as an *InBox*.

Robots

The term *robot* means any automated InfoImage client program that you can individually configure in the Registry. The following three robots are included with the system, and are ready to use in workflow:

- **Gather Robot** enables you to gather all workitems in a Workflow Domain that are related to a specific workitem based on the criteria you choose.
- **Prefetch Robot** uses pre-defined selection criteria to automatically collect all the documents in a Workflow Domain that are related to each workitem that is retrieved from a particular workset.
- **SysDelete Robot** enables you to automatically perform a SysDelete on every workitem the robot retrieves from a particular workset.

In addition to the three robots that the system provides, you can write your own custom robots using the robot template and CAL OLE Automation Interface.

Queues

In a Workflow Domain with more than one server, each queue is distributed across all the Workflow Domain Subsystems. When you attach your InBox to a queue profile, the system chooses which server should supply the work, based on the relative processing rates at all the servers.

Workflow Designer also enables you to create a rule to track the number of workitems in any queue, or the *queue depth*. This feature is useful when your route needs to ensure that the size of the queue doesn't get too large.

Worksets

The default ordering for a workset is first-in first-out (FIFO). If a different ordering is needed, the route designer can specify statements that change the way items are sorted as they are added to the workset. These statements use the values stored in variables to determine whether a given workitem should be included in this workset and to determine the ordering of workitems in the workset.

Any number of worksets can be associated with a workstep. Therefore, if different users at a workstep are drawing from different worksets, they may be seeing different subsets of the available items and/or different orderings. This feature can, for example, be used to direct certain workitems to a select group of workers, or to order the workitems differently for different groups—even though they are all pulling work from the same workstep.

Example

Consider a workstep where workers approve or reject an application for a loan. There are three levels of workers: senior, middle, and junior. Senior workers can process loans of any size; middle-level workers can process loans under $5,000; and junior workers can process loans under $2,000.

The ordering needs of these groups are different. For loans over $5,000, those requesting the most money should be processed first. For other loans, they should be processed approximately in the order received.

The following worksets are one of many possible solutions for this scenario:

Senior:
sort by: amount, descending
include: all (the default inclusion)

Middle:
sort by: timestamp, ascending
include: if amount < 5000

Junior:
sort by: timestamp, ascending
include: if amount < 2000

The Senior workset is defined to include all loan applications are included. After finishing work on the applications over $5,000, the InBox contains workitems under that amount, but still in decreasing order by amount. To see them ordered by timestamp, that user can change to the Middle workset.

Internally, the workset is implemented as an SQL query that selects and prioritizes the workitems in a workstep. A system administrator selects the worksets to which each user has access.

InBoxes

Each user has a personal queue associated with the assigned user name, profile, and role. Normally, only a specific user can draw work from that queue. The personal queue has a single workset sorted by priority and timestamp. The personal queue name is the same as the user name.

For the Client Work Manager InBox, the first workset listed is that user's personal queue.

For information on Inbox modes, see Section 5.

Variables

Variables are containers for data values. These values are used in pre-processing and post-processing rules, worksets, and workstep processing. The system supports the following variables:

- Date and time
- Route
- User
- Workitem

Appendix D of the *Workflow Designer User's Guide* provides a comprehensive list of variables, including each variable's data type and purpose.

Date and Time Variables

Values for *date and time variables* are obtained from a system calendar or system clock. Examples include time, Julian day, and day of the week. Ten data and time variables are available.

Route Variables

Currently, only *custom route variables* are available. A custom route variable has the same value for an entire route. It is defined and assigned an initial value using Workflow Designer. Custom route variables are used in workset definitions and in workflow rules. The values of these variables are "read-only" in workset definitions and workflow rules, but an administrator can change the values using the Central Administration Console.

This makes custom route variables very useful when a external value that changes may effect processing for the entire route (for example, a national interest rate). Custom route variables can be defined with the following data types: integer, string, or a list of either string or integer values.

User Variables

User variables provide storage for a user-specific values. Each user variable can have a unique value for each user defined in the system. These variables are provided by the system or can be custom-defined:

- Currently, only one system user variable, Username, is defined. This variable contains the name of the user currently working on a workitem and can be used to create dynamic worksets. Dynamic worksets are custom worksets created for individual users.
- Custom user variables are defined and assigned an initial value using Workflow Designer. Custom user variables are used in workset definitions and in workflow rules. The values of these variables are read-only in workset definitions and workflow rules, but an administrator can change the values using the Central Administration Console.

Custom user variables can be defined with the following data types: integer, string, or a list of either string or integer values.

Workitem Variables

A *workitem variable* provides storage for a workitem-specific value. Workitem variables have a value for each workitem and are provided by the system or can be custom-defined:

- A *custom workitem variable* is a workitem variable that is defined with Workflow Designer. The system supports up to 30 integer and 30 string custom variables per workitem. These variables are defined and assigned default values using Workflow Designer. New values can be assigned to custom workitem variables through set actions. For more information, see "Pre-processing and Post-processing Rules."
- A *system workitem variable* is a workitem variable that is provided by the system. The values may be set through system events. Some system workitem variables may be assigned values through set actions; other variables are assigned values by the system. The system provides 40 of these variables.

Using Variables in Building Worksets

A workset's selection and sorting criteria are known as *statements*. Statements are constructed in Workflow Designer and are based on the values in certain variables. For example, one workset might be defined by the following statements:

```
include if
   class = "INVOICE" or customer code >= "K0400"
   and state is in list ["OH", "MI", "IN", "IL"]

sort by
   workstep entry time ascending and amount
   descending
```

Class and workstep entry time are system variables. Customer code and state are string custom variables; amount is a numeric custom variable.

The Workflow Designer code converts the set of criteria for a workset into an SQL database query. It uses the results of that query to feed work to resources that are drawing work from that workset.

Pre-processing and Post-processing Rules

The designer of a route can set up conditional actions that occur when a workitem enters or leaves a workstep. The expressions that invoke these actions and the conditions that determine whether they are carried out are known as *rules*.

Depending on whether they occur at entry or at exit, they are known as either pre-processing rules or post-processing rules.

Workflow Scripting expands the ability of a workflow developer to create and implement workflow evaluation rules. The integration of Workflow Scripting enables the Workflow Designer and Route Engine to serve as ActiveX Scripting hosts that execute scripts written in any language that supports Microsoft's ActiveX Scripting standard, such as VBScript and JScript. Refer to *Workflow Designer User's Guide* for specific information on Workflow Scripting.

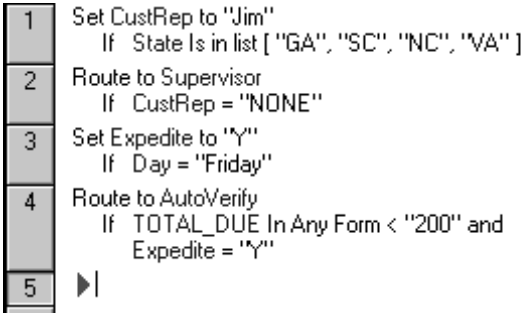
These are the basic actions that can take place during rule evaluation:

1. Set a variable or form field.
2. Execute a workflow script.
3. Route to another workstep.
4. Send email notifications to specified users.
5. Put the workitem into error.
6. Remove the workitem from workflow.

An ordered set of conditional actions is known as an *action list*. Depending on the type of workstep, there may be a pre-processing action list and there may be a post-processing action list. Because each action can include a conditional expression that determines whether the action should be performed, and because actions 3, 4, and 5 stop rule evaluation on the current list, not all actions are performed.

A conditional expression is one that evaluates to either true or false. This expression uses variables, form field values, and return values of a workflow script to determine whether the action should be performed. These four rules are processed in order, or until one of the rules terminates the action list.

The following illustration shows post-processing rules:



If CustRep equals NONE, the last two rules are bypassed because the **Route to** action (action 2) terminates evaluation of the list.

Workflow Scripting for Enterprise Integration

The implementation of scripting within the pre and post processing rules allows integration points with full access to all enterprise systems. The scripting engine supports any Visual Basic Script, Java Script. The new script rules that can be added to any workstep are:

Execute Script-name

Set V = Script name

If V <> Script name

The scripting is fully integrated with Workflow Designer and a Script Edit Tool is provided to enter the scripts and check for proper syntax. Scripts can be tested along with the route using the testing facilities of Workflow Designer.

A script will access the workflow environment through a complete object model. Areas covered by the object model are:

Date & Time

System User Variables

System Workitem Variables

Custom Route, User, and Workitem Variables, Form Fields

The Route File

When Route Engine goes through the initialization process, it reads the route file created in Workflow Designer. The information in this file contains everything Route Engine needs to know about the route, including the worksteps, the worksets, and the rules that the designer defined. No scripting language or traditional programming is necessary. Therefore, this program provides the administrator, who understands a department's business requirements, with the necessary tools to set up and maintain the route. It is not necessary to call in programmers when the needs of the department change.

Section 4
Design Tools

This section describes Forms Creator and Workflow Designer, which are graphical programs used to design electronic forms for workitems and to define the paths these workitems can follow in workflow.

Forms Creator

Using Forms Creator, you can create forms for

- Maintaining coded data
- Indexing data
- Retrieving indexed workitems from the File Cabinet
- Routing documents and folders

The main Forms Creator window is a canvas on which the designer can lay out fields (indicated by gray rectangles) and text. The designer specifies the attributes of each field in the Field Definition window. Users can create their own custom forms to meet the specific requirements of the application without the need for programming.

Forms Creator can run in any environment in which Windows 95, 98, 2000, and Windows NT runs. Forms are created with this tool and then installed on an enterprise and Workflow Domain using the Central Administration Console.

Forms are downloaded to workstations on demand where they are stored in a temporary cache. The forms cache is flushed at the beginning of a session so that updates to the forms are propagated to the workstations when needed.

Fields

Using Forms Creator, the user can create fields and position them in a window. For each field in a form, the user can specify several attributes, including:

- Type of data (text, number, currency, yes/no, date)
- Width of data
- Prompt
- Default value
- Value list
- Assigned zone on associated image

Views

Fields can be assigned to one or more views for any of several purposes. A *view* is a named group of fields. One use of a view is to restrict a user's access to the fields in a form by defining each view as read/write, read-only, or hidden. Another use is to specify which fields in a form require data-entry verification. These "verify" fields are entered twice and the second user is notified if the data entered did not exactly match what the previous person entered. This allows that person to determine which of the two entered values is correct.

There are two pre-named views with other uses. A view named SQL is used to define which fields should be copied to the Attributes table for use as indexing fields.

A view named INBOX is used to define which fields should appear as columns of data in a tabular view of the workitems at appropriately configured workstations.

Creating Zones for Field Tracking

Forms Creator permits the mapping of form fields to rectangular *zones* on the image. These zones can be used in two ways.

During manual data entry, each zone is highlighted when the user is entering data into the associated field. Within the page viewer, the highlighting takes the form of *reverse video*. If the magnified field viewer is turned on at the workstation, the zone is doubled in size within that viewer.

This feature can increase productivity in the processing of consistently formatted documents by showing all image data to the user in the same place on the screen.

Linking Form Fields to Mainframe Data

For systems running DMWS or HPWS, the designer of a form can use Forms Creator to link fields in the form to locations on terminal emulators (such as 3270 and 5250 screens). Then at runtime, a user can press a single function key on the keyboard to copy data either from the form to the terminal emulator or from the terminal emulator to the form. In this way, a mainframe application can share data with the system without the need to reenter fields.

For Client Work Manager users, terminal emulation is enabled by writing Form User Exits using Form Viewer's ActiveX object model. For more information on terminal emulation for Client Work Manager, see Section 5.

Form User Exits

A user exit facility is provided for customers with specific processing requirements not covered by existing features. Each field can be given either of two attributes to indicate that a user exit is associated with the field. A user exit is custom code written for a specific application. The user exit is invoked by the standard software in response to an event. One attribute indicates a *type-check* user exit, which will run after each keystroke within the field. This feature permits the software to validate each keystroke before echoing it to the screen. For example, when entering a two-letter state code for any of the United States, if the user types Z for Arizona, it will not be accepted, but AZ will be accepted as the valid code.

The second attribute indicates a *field-exit* user exit, which is run when the user leaves the form field. This feature permits the software to validate the entire field or to modify any fields based on either values already typed or data from any external source. For example, after the user types AZ, "Arizona" can be inserted into the state name field, or the Zip Code in another field can be checked to verify that it really is in Arizona, and cleared if it is not.

User exits can also be written to handle the form load and form unload events.

Workflow Designer

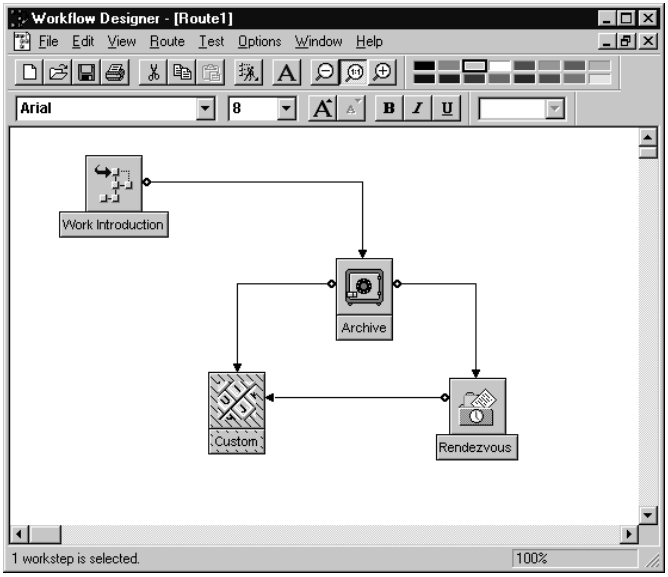
Workflow Designer enables an administrator to define how work flows between processing steps. Using Workflow Designer, you can create all aspects of the workflow. This design starts with the drawing of a map where icons represent processing steps and arrows represent potential paths through the workflow. The designer then uses dialog boxes to specify

- Rules that define the path a workitem will follow.
- Statements that conditionally modify form data associated with a workitem.
- Worksets associated with each worksteps queue.
- Rules that select and sort workitems into these worksets.

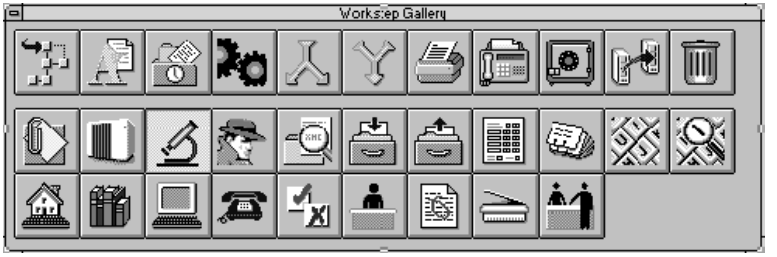
Refer to the *Workflow Designer User's Guide* for specific information on designing a route.

Drawing the Route

The following illustration shows the Workflow Designer window in which the start of a simple route has been drawn.



The icons are chosen from the following gallery of worksteps.



Defining Worksteps

After laying out a map of worksteps and paths, you continue the design process by defining the action lists and the worksets at each workstep. In Workflow Designer, double-clicking any workstep icon in the map opens the Workstep Properties dialog box. Depending on the type of workstep, the Workstep Properties dialog box displays tabs used for defining a particular aspect of workstep processing.

Tabs

Use the **Summary** tab to define basic information about the workstep, both incoming and outgoing connections, as well as workstep attributes. The other tabs correspond to the stages of activity within the workstep: pre-processing, processing, and post-processing stages (as many as exist). For additional information, see Section 3.

Pre-processing and Post-processing

The tabbed sections for both the pre-processing and post-processing stages present the same array of data entry fields for defining rules. In these sections, the administrator can define an ordered list of rules. Workflow Designer prompts the user with a list of possible tokens, limiting the rules to valid statements only.

For more details on how these rules control the behavior of workitems, see Section 3.

Worksets

Workset statements determine what workitems appear in a user's InBox, and the order in which they are presented. These statements are defined in the Worksets section of the Workstep Properties dialog box for any user workstep. A workset is made up of Include If and Sort By clauses. The custom variables and system variables can be referenced in these clauses.

For additional information, see Section 3.

Processing

Each of the system worksteps types has its own processing tab, which is named for the type of workstep. The data requested depends on the type of workstep.

By contrast, setting up a Rendezvous workstep requires much more information. The application designer has to specify all the matching criteria by which incoming documents and folders are collected into a rendezvous folder. In addition, the designer can define expiration intervals and error events.

Setting a Workday Schedule

Workflow Designer enables you to define a workday schedule for routes in which the processing is dependent on the calendar date. In defining the schedule, you tell the route which days should not be counted as workdays. Workflow Designer enables you to create multiple schedules as your business needs dictate.

Testing the Route

Workflow Designer includes a feature called Route Tester, that enables the route designer to test the route by sending a mock-up of a workitem into workflow with specific values in its variables and form data. With this facility, the designer of a route can detect errors in the implementation of a new route before it is put into production.

The designer can either send a workitem all the way through workflow, or send it one step at a time, modifying data values at any point. An audit trail that logs both rule evaluations and the path taken allows the tester to verify that all rules behaved as expected.

Section 5
The Workstation Interface

The workstation's user interface includes workitems and tools. Workitems are folders and documents. Tools are used to manipulate workitems. Examples of tools are the Desktop, the File Cabinet, Roles, the InBox, and the Document Viewer.

The system offers several workstation interfaces. To simplify the descriptions, the Client Work Manager interface is described in full. The other interfaces are described by how they differ from the Client Work Manager, in the "Specialized Workstations" section.

There are two versions of Client Work Manager available, Client Work Manager Standard Edition and Client Work Manager Professional Edition (with VBA Add-on).

Desktop

The desktop is the base window for the Client Work Manager. It is a four-pane window that includes the most frequently used tools and the workitems currently on the user's desktop. In addition, there are three tabs in the Preview pane that enable you to preview a document's pages, notes, and imports.

Shortcut bar	Left pane. Provides customizable icons you can use to access the most common Client Work Manager and external functions. By default, the Shortcut bar includes icons for the Client Work Manager tools: • Workitems list • Inbox • File Cabinet • Outbox You can add other icons to the Shortcut bar that represent folders, workitems, Inbox queues, or File Cabinet inquiry forms. You can also add shortcuts that run external applications, like the Windows Calculator.

Desktop List pane	Middle pane. Shows the tools you can use. These tools are arranged in a hierarchy based on the security and access permissions granted to the user. Any tool in the Desktop List can be added to the Shortcut bar for quick access. Select a tool to display the contents of the tool in the Grid pane.
Grid pane	Right pane. Displays the workitems, search results, documents, or folders available on the desktop. From the Grid pane, you can perform workitem-specific functions such as opening a workitem, deleting a workitem, creating a new folder or document, and setting parameters.
Preview pane	Optional. Displays thumbnail sketches of the pages, notes, and imports included in the document. The *Preview Header* displays basic information about the contents of the document: the name of the document, number of pages, notes, and imports. The optional *Preview Detail* pane displays a preview of any selected document page.

The Workitems List

Workitems are the documents and folders you can act upon. Workitems can arrive on your desktop, automatically routed to you for processing, or you can select the workitems to process from Inbox queues. You can also retrieve workitems from the File Cabinet where documents and folders are stored for future inquiry or processing.

The Document Viewer

When you open a workitem, the Document Viewer displays the pages and attachments of a workitem, depending on your viewing preferences. A menu bar and toolbar enable you to select actions to perform on the workitem. Menu and toolbar selections include filing the document in a folder, opening the data form for reading or entering values, viewing the document's notes, printing, faxing, or emailing the document and its contents, and sending the document to a step in workflow or to another user.

From the Document Viewer, you can

- Enlarge or reduce the page image
- Rotate it in 90 degree multiples
- Zoom in or out on an area of the page image
- Reverse the display of black and white
- Add annotations and other markups, which are saved with the page but do not modify the base image. Once saved, you can only add notes and markups to a workitem, but you cannot change the base image. However, you can still add and delete pages.

Once a document is open in the Document Viewer, you can double-click a thumbnail in the Preview pane to open the selected page in a separate window called the Page Viewer. The Page Viewer enables you to open multiple pages at the same time, and you can arrange them to compare pages or examine them more closely. In the Page Viewer, you can

- Zoom in or out on an area of the page image
- Select an area of the page to copy or paste
- Print the page

You can save changes to a page image at any time. If you close the workitem before you save the changes, a message asks whether you want to save the changes.

Folders

A *folder* is a type of workitem that contains other workitems, including folders, and is similar to a file folder in a manual filing cabinet system.

In the Desktop List, click the folder name in the Grid pane to display a list of workitems and subfolders in the folder. Click the folder name in the Grid pane to display the contents of the folder in the Preview pane. To open a document workitem within a folder, double-click the name of the workitem.

Markups

A markup is an object that is placed on a page. You can move the markup within the boundaries of the image, much like a "sticky note" on a sheet of paper. Markups are saved with the page when the document is written to the server and to archive. You can apply four types of markups to a page:

Markup Type	Description
Highlight	Rectangular region of color (or gray on a monochrome monitor).
Annotation	Free-form text.
Stamp	Bitmap of a small image, such as a checkmark or the word APPROVED.
Initials	User's logon name and a timestamp in a colored rectangle. It is a kind of electronic signature that indicates the name of the individual who applied it and at what time.

The system administrator may define, in the user profile, whether the user has the ability to access page markups. When granted, the user can create, modify, and delete markups. The Modify and Delete options can apply to markups created by the user, or to all markups accessed by the user.

Imports

Imports are pages or files that are created by an application other than Client Work Manager, such as Microsoft Word, Microsoft Photo Editor, Microsoft Excel, or Adobe Acrobat. You can import pages or files into a document or folder workitem.

There are two types of imports:

- Imported pages
- Imports

Imported pages are image files in native format. A native format is any format that Client Work Manager can read and display. The following table identifies Client Work Manager's native formats:

BMP	PIC
DCX	PNG
DIB	PPM
GIF	RLE (read only)
ICO (read only)	TGA
JPG, JIF, JPEG	TIF
PBM	WMF (read only)
PCX	WPG
PGM	

Imports are files in a non-native format. A non-native format is any format that Client Work Manager cannot read and display. Non-native formats require the application that created the file to read and display the file.

Within a document workitem, an import is included among its document pages. Double-click an import icon to start the application program required to view and act on the import file. When you want to display a non-native import file, Client Work Manager will run the application that can read and display the file. For example, if you import a Microsoft Word file, Client Work Manager opens the Word document in the Word application window.

Imported pages are grouped in the Preview pane under the Pages tab, while imports are grouped under the Imports tab.

Notes

A note is similar to an annotation, but is part of a workitem rather than a page. Notes are useful for general information, comments, or reminders that relate to the entire document or folder.

The Inbox and Outbox

To the user, the arrival and departure of work takes place through the Inbox and the Outbox. The Inbox displays a list of workitems, called a workset or queue. You can choose a workset from which to draw work, and you can define the number of workitems listed in the Inbox.

The Inbox includes a personal mailbox that contains workitems routed specifically to you. While any user with the correct authorization can view the workitems in the Inbox queues, only you can view and open the workitems in your personal mailbox.

Inbox Modes

There are two retrieval modes for an Inbox. You can choose these modes from the User Preferences dialog, which is accessed via the Tools menu.

Mode	Description
ListNext	Provides a continuous supply of workitems from an Inbox queue to the Workitems list. When a workitem is closed or routed, another workitem takes its place in the list. To increase user productivity, you can set the Autoview user preference to automatically display the next workitem at the top of the list.
ListAll	Enables you to select specific workitems from an Inbox queue to process in the order you choose. You can manually open workitems in this mode, or you can set the Autoview user preference to automatically open the workitem you select.

WIP Retrieval Options

The WIP Retrieval options, described below, determine the state of the workitems retrieved from a workflow queue.

Options	Description
Reserved	Retrieves and locks a workitem for modification by the user. Once reserved, no other user can retrieve the workitem from the queue, and any user who attempts to reserve a copy of the workitem receives a message indicating that the workitem is reserved by the specified user and the workstep name from which the workitem came. In the Grid pane, the Reserved column shows a pencil icon to indicate a reserved workitem. Reserved is the default retrieval mode.
Unreserved	Retrieves workitems without locking them for modification by the user. Other users can retrieve and display the workitem unreserved. Unless you are modifying a workitem at a given workstep, set your preferences to Unreserved to prevent workflow bottlenecks. In the Grid pane, the Reserved column is blank for an unreserved workitem.
Attempt Reserved	Reserves each workitem that is not already reserved by another user. If another user has the workitem reserved, a read-only copy is retrieved to the user's desktop.

Outbox Mode

The Outbox lists all workitems you completed and routed to the next step in a workflow, to another user mailbox, or to a supervisor since the time you logged on. The workitem contents listed in the Outbox are no longer on the desktop, so you cannot open, reserve, or change them. Only a notation remains to indicate that you processed the workitem. When you end your Client Work Manager session, the Outbox is automatically emptied.

The File Cabinet

The File Cabinet enables you to retrieve workitems from storage. To view or change a document in the File Cabinet, you must retrieve the document to the Workitems list.

To find a document or folder, you select an appropriate query form from a list of authorized query forms. Next, you specify criteria on a query form, with or without wildcard characters, and then run the query. Previously run queries are saved for reuse during the current session.

The result is a list of matching workitems displayed in the Grid pane. You can then do any of the following:

- Select the workitems you want to retrieve.
- Indicate whether to retrieve the workitems reserved.
- Indicate whether to retrieve the workitems to the desktop or to a folder on the desktop.

Roles

A role is a set of rules that defines your desktop. Typically assigned by the administrator, the role establishes what toolbars, grid views, shortcuts, and user preferences you have on your desktop. If you are assigned multiple roles, you can switch between them. If the administrator enables those permissions, you can further customize your desktop.

Both Visual Basic for Applications (VBA) macros and Visual Basic Scripts (VBScripts) may be part of a role. Using them, administrators can create functions that can be assigned to tools on the toolbars.

VBA allows administrators to access external objects as well as Client Work Manager objects. With VBA, administrators can create Visual Basic Forms and include third party controls to create a user interface tailored to specific requirements. VB Scripts provide administrators with features similar to those in VBA, except that VBScript does not support any user interface (except message boxes).

Printing, Faxing, and eMail

You can print or fax workitems to a customer or other recipient from any of the following sources:

- Document Viewer
- Print/Fax/eMail tool on the desktop
- Microsoft Outlook

You can specify a remote or local printer, or the telephone number to which the workitem should be faxed, as well as which parts of the document or folder should be sent. When you select eMail, a new email message opens with the selected documents or pages attached to the message.

Workstation Functional Security

Client Work Manager provides two levels of functional security.

The Central Administration Console enables a system administrator to establish functional security by enabling and disabling individual workstation operations for each user. See the Central Administration Help for a complete list of functions that can be secured.

The second level of workstation functional security is the Client Work Manager desktop. When you define a role with custom views, toolbars, menus, and user customization privileges, you can deny the user of a role access to any tool.

If you set functional security for an option in CAC, you cannot use that option in the desktop, regardless of how you set desktop security. For example, if you deny a user print capability in CAC, the print option is always disabled in the desktop. On the other hand, you can enable print capability in CAC, but deny it in the desktop by removing the Print tool from the menus and toolbars for the role.

Integration

Unisys Client Work Manager provides a standard desktop with complete, out-of-the-box functionality, modern user interface, and easy integration with other applications. Client Work Manager can be customized to handle the specific needs of the application by using various interfaces that enable the developer to implement customized code.

Through these interfaces, the developer can take advantage of the Client Work Manager function set to design, write, and integrate customized code to enable special features into the desktop.

Client Work Manager enables this integration by:

- Exposing its business objects for external applications
- Supporting VBScript as a standard scripting language
- Supporting VBA as an optional scripting language

Client Work Manager has the following interfaces:

- Client Work Manager ActiveX Interface
- Form User Exits
- Import User Exit Interface

ActiveX Interface

The Client Work Manager/View Client Interface is a library of ActiveX Objects that provides a convenient interface for using the features of Client Work Manager and View Client to build a customized desktop.

Because Client Work Manager is designed as an object model and is an ActiveX executable, its properties and methods are exposed and it therefore provides for a Component Object Model (COM) interface to the desktop. This COM interface enables a smooth integration for developers to use Client Work Manager's numerous functions and attributes in their customized applications.

The developer can access workitems, the desktop, Workflow Domains, form fields, image pages, and so forth, as well as perform numerous other functions from the external program to customize the Client Work Manager for the specific needs of the business application.

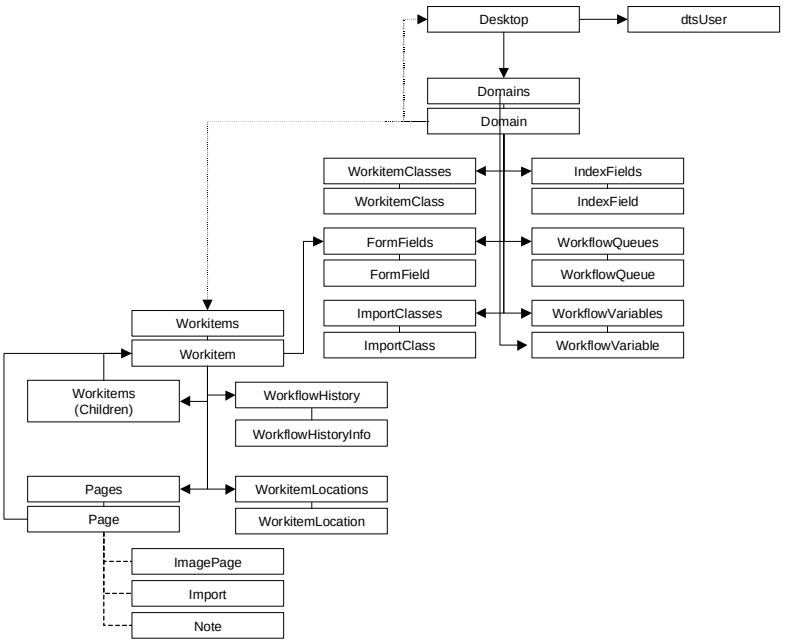
Development Environments

The following table describes the various development environments supported by the Client Work Manager/View Client Interface.

Development Environment	Description
VB	Client Work Manager must be installed to use the Client Work Manager ActiveX Interface. Since Client Work Manager exposes its objects, a Visual Basic project that defines a customized program can use those exposed properties and methods. Customized applications can be run as executable programs, with their own convenient Visual Basic forms that include third party controls to create a user interface tailored to the specific requirements. These customized programs can also be assigned to a tool on a toolbar.
VBA	The VBA development environment is included in the Professional Edition of Client Work Manager. If the option is set, the Integrated Developer Environment (IDE) will be tied to the host application, Client Work Manager, thus enabling the developer to toggle between the IDE and the Client Work Manager host window. The developer can then create programmable applications (VBA Macros) that perform some customized function by accessing external objects as well as Client Work Manager objects. In the VBA environment, the developer can create Visual Basic Forms and include third party controls to create a user interface that is tailored to the specific requirement. Typically, the host application provides a menu item such as the Visual Basic Editor command, from the Macro submenu of the Tools menu. Thus, a VBA Macro can be created within Client Work Manager. VBA Macros can be assigned to a tool on a toolbar, as detailed in the next section.
VBScript	VBScript is available as part of the core product of Client Work Manager. While the scripts are assigned to tools on toolbars, they do not have the development environment of VBA. The VBScripts are made up of customization functions that access the exposed properties and methods of Client Work Manager. VBScripts are created using a generic text editor such as Notepad or Wordpad. VBScript does not provide a user interface (like a Windows dialog box).

Client Work Manager Object Model

This diagram illustrates the Client Work Manager object model:



Form User Exits

Form User Exits are customized programs, scripts that are written in VBScript or VBA. Examples of such processing might be special validation of form fields, and custom calculations of form fields, including terminal emulation. By using the exposed properties and methods of the FormViewer object, the developer can write customized programs that perform specialized processing operations on InfoImage form data.

Form User Exits are implemented in VBScripts or VBA. For a description of applicable development environments, see the VBA and VBScript sections of the table shown under "ActiveX Interface."

Import User Exit Interface

Import User Exits are customer-written functions that enable customized capabilities to be added to the Client Work Manager Import processing. The Client Work Manager Import User Exit's object model exposes its properties and methods and therefore provides for a COM interface to the desktop. This COM interface enables a smooth integration for developers to access the Import User Exit's numerous functions and attributes within their customized programs.

User exits provide additional processing that is required in a specific workplace environment for designated import classes. For example, the user may want to perform a special validation process for an import when a workitem that contains an import class is sent to workflow.

Section 6
System Administration

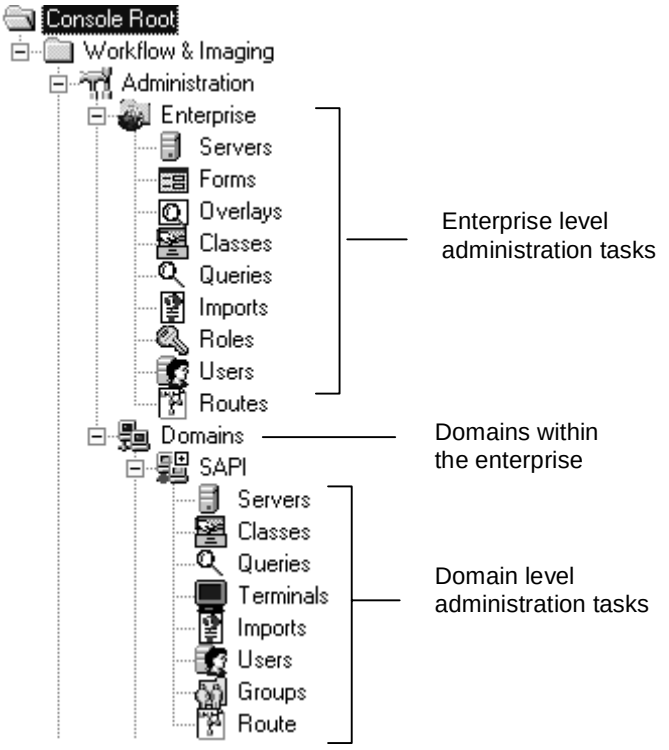
System administration comprises several groups of tasks:

- Maintaining the route, routing rules, forms, and other parts of the workflow definitions.
- Defining the classes, forms, queries, and imports with which the system must interact.
- Defining the users and their roles, including their security access to:
  - Various capabilities of the software.
  - Classes of documents.
  - Worksets within the workflow.
  - Customization rights on Client Work Manager.
- Monitoring the flow of work to make adjustments of personnel and other resources.
- Performing backup and recovery.

The Administration Console

The Central Administration Console includes two administrative snap-ins that give administrators the ability to communicate with Workflow Domain Subsystems in multiple Workflow Domains, while maintaining an enterprise level database. These critical tools are the Administration Console, shown below, and the Operations Console, illustrated later in this section.

The Administration Console provides all the basic tools necessary to administer the flow of data through the system as well as the users who will have access to that data.



Administration Tools and Tasks

The Administration Console includes the following tools for managing workflow and imaging data.

- The Routes tool enables the administrator to install routes in the enterprise and Workflow Domains.
- The Forms tool permits the installation and removal of the form files that were created with Forms Creator.
- The Queries tool permits the creation of a new query and its association with a form name.
- The Classes tool permits the addition, modification, and deletion of classes for documents and folders. Each class can include a form name and other attributes.
- The Imports tool permits the addition, modification, and deletion of classes for attachments. Each class can include the filename of the icon, as well as the full path and file name of the program that serves as a viewer for the attachment.

  For CWM users, terminal emulation is enabled by writing Form User Exits using Form Viewer's ActiveX object model. For more information on terminal emulation for CWM, see Section 5.
- The Users tool enables the administrator to specify the services, workitems, menu options, and data that the user may access. In addition, it enables you to define the user's role, which determines the extent to which a user may customize the desktop.
- The Roles tool enables the administrator to establish a role based client configuration at the Enterprise level. A role defines the full range of capabilities and restrictions for a given job description within the imaging and workflow environment. The CAC UI enables a role to be associated with a specific route, specific Workflow Domains and users, InfoImage functional security, specific user interfaces defined by a Client Work Manager Desktop Role and/or a Thin Client Digital Dashboard, access to worksets, access to queries, printer and fax services and form views.

- The Groups tool enables the administrator to create groups, add users to one or more groups, and assign various levels of group access to a workitem or import class.
- (For DMWS and HPWS users only) The Terminals tool permits the association of mainframe terminal emulation screens (such as a 3270 or 5250) with queries and classes.

Administering the Route

In a perfect world, a department sets up a workflow route once and uses it unchanged forever. In the real world, new functionality needs to be added, or conditions changed, prompting a modification to the route.

The system permits the managers who understand the business to make changes directly to the forms, routes, routing rules, and worksets. No scripting or traditional programming is required. Such changes can be instituted using Forms Creator and Workflow Designer. Both tools are described in Section 4. Routes are installed in an enterprise and Workflow Domain using the Administration Console.

Administering the Role

New roles are added to the system with the Roles tool on the Administration Console. For each new role, the administrator assigns users, Workflow Domains, security, printer/fax services, Inbox, Outbox, form views and queries. For more information about how to add or create and modify roles, see the *Central Administration Help*.

Administering the User

New users are added to the system with the Users tool on the Administration Console. For each new user, the administrator assigns a user ID, a password. No two workstations can be logged on to the system with the same ID at the same time.

After a user ID is added to the system, the Users tool permits the administrator to define properties for the user. User properties include a list of the functions the user can perform and the resources to which the user has access.

For example, each user may be assigned any of the following basic parameters:

- Access to the worksets from which the user draws work.
- Access to print and fax services.
- Access to a list of permitted File Cabinet queries.
- Determination of appropriate views into the form data.
- Full rights to customize the Client Work Manager desktop.
- The capability, usually reserved for supervisors, to perform administrative or operational tasks using the Central Administration Console.

The properties defined for each user provide the principal means of designating the security access of each person who is assigned a user ID and a password. Other parameters that define functional and supervisory privileges can be combined with the parameters to achieve the desired security level for each user. These privileges are described in the following sections.

Administration Functional Security

Through the CAC user interface an administrator can enable or restrict the access rights of the CAC Administration console. Security is applied to all administrative functions (e.g., *create, delete, view properties, update properties, get, etc.*) to each type of system object:

- Domains
- Servers
- Forms
- Overlays
- Classes
- Queries
- Imports
- Roles
- Users
- Routes

- Terminals
- Groups

With the new security features, Administrators can be restricted to specific Workflow Domains, or can be given permission only at the enterprise level (no Workflow Domains). All CAC functions now have security applied to them, and permission can be granted or denied to any individual administrative or operational function, at the enterprise or Workflow Domain-level.

Since there are over 100 functional administration permissions that can now be enabled/disabled, CAC also makes the process easier through three mechanisms: permission groups, permission copying, and permission profiles. These mechanisms can be used in any combination with each other.

- *Permission Groups* – the permissions are arranged hierarchically, so that an entire related group of permissions can be granted or denied with a single mouse click. For example, by enabling the Users group for a Workflow Domain, over ten individual permissions are set at once.
- *Permission Copying* – CAC provides a new function, "Copy Security Profile," to allow an administrator to copy part or all of a user's security profile, to one or more target users. This is similar to the existing **Copy User Profile** option, except that it applies to an administrator's or operator's security settings.
- *Permission Profiles* – to simplify the process of repeatedly setting a large number of permissions, when the permissions apply to a particular *type* of administrator (similar to a Role), CAC supports the concept of permission profiles. Profiles have been defined that, when selected, will replace a user's entire set of permissions with those from a named profile (for example, **Grant all domain privileges for Users and Roles**). This will eliminate potential errors where the user might forget that a particular setting is required for a certain type of administrator. The profile definition file is an XML file that is customizable at the customer site.

User Functional Security

Documents, folders, pages, and notes can be made available to any user at various levels. These levels of access are referred to as *functional security*. Functional security includes the ability to create, modify, and delete workitems.

Functional security is defined by the system administrator by using the Users tool while creating the user profile. The process of adjusting functional security for users is further simplified using the Roles tool. Since many users can be assigned to one role, therefore, through role based client configuration UI, functional security is assigned to a role that, in turn, is assigned to all of the users in that role. Refer to *Central Administration help* for specific instructions on how roles are used to adjust functional security.

The functional security levels are briefly described in the following table.

Level	Description
Create, Modify, and Delete Note (Page Markups)	Provides the Modify Any and Delete Any note privilege levels. A similar level exists for Page Markups. When selected, the user can modify and delete any and all notes (or page markups) that the user can access.
Modify If Creator and Delete If Creator	Permits the user to modify or delete only those notes or page markups that the user created originally.
Renaming Folders	Provides the Name option in the Folder dialog box. When selected, the user may rename a folder using the Folder Name menu option. The Rename Workitems, Notes, Pages and Imports functions handle the renaming process in the same way as the Rename Folder function.
Access Notes Within Documents and Folders	Allows the user to access notes within documents and folders. When accessing a note, the user may get the note number, name, and text from within a document or folder. (This privilege applies the same rules as the Create, Modify, and Delete Note function.)
Access to Workitem History	Allows the user to access the history of documents and folders, including the size and text content.

Administering the Supervisor

There may be times when it would be helpful to the administrator if the departmental managers (or supervisors) could retrieve reports, view status displays, move workitems within the workflow or release reserved workitems from users.

The Users tool enables the administrator to grant access to the Administration Console or Operations Console to any user. In addition, the administrator can restrict access to the Administration or Operation Console functions based on criteria such as the user's job function.

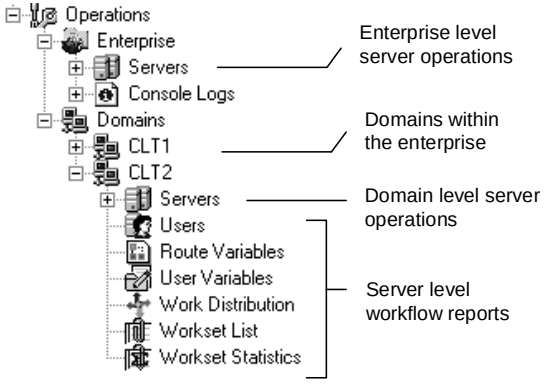
Administering Groups

The system permits an administrator to specify the access level of each group of users to each class of documents, a feature known as *object security*. The three levels of access are write, read, and no access. With this feature, the system can filter workitems received through the InBox and the File Cabinet based on the class of each workitem.

With the Groups tool, administrators can assign users to one or more groups. Groups can contain other groups and users. Access privileges for each class of workitems are assigned to a group, thereby defining the access level for each member of the group. For details, see the *Central Administration Help.*

The Operations Console

The Operations Console, shown below, can be used to start and stop servers, view log and debug files, manage workflow, and other tasks.



Administering the Workflow

At the Workflow Domain level, the Operations Console provides workflow reports, including several tables listing the location of work across Workflow Domain Subsystems, worksteps, and worksteps. Some of these reports permit the user to interact with the workflow queues. For example, an administrator can release work that is held at a workstep because processing could not be completed there (perhaps because an external resource was unavailable).

The following list provides an overview of these reports:

Report Name	Description
Servers	Displays a row for each server with its current status and the name of the processes running there.
Users	Lists of all users, their worksets, time they logged on to the current session, the number of items processed, and so forth.
Route Variables	Displays the custom route variables that are associated with a specific route.
User Variables	Displays the custom user variables that are associated with specific users.
Work Distribution	Provides a snapshot of the amount of work at each workstep on each server, together with data about that work.
Workset List	Displays the worksteps and associated worksets.
Workset Statistics	Displays active cache statistics for each workset.
Contents	Allows you to view the contents of a workstep, user mailbox, or workset. The report is a table with a row for each workitem in the selected queue. Provides a report of failed fax-out jobs. The administrator or supervisor (after being granted security access rights) may use the report to monitor and resolve failed fax-out jobs.

Each of these reports describes the system at the instant the report was generated. By comparing several of these snapshot views of the workflow taken throughout the day, an administrator can see whether there are bottlenecks that require moving users from one queue to another.

Custom Reports

The system maintains data about workitems and queues. The data is stored in database tables that reside on the Workflow Domain Subsystems and the Central Administration server. A system administrator can gain access to this information either through a user interface to the database engine or by writing a program that reads and processes the data and formats it in a custom-designed report.

Although administrators have access to the information in these tables, no person or process should ever directly change any data within the database.

One table in the database is designed to be a source of data about the movement of workitems through workflow. A record is written to the Log table each time a workitem changes status. For example, entries are added when a document enters workflow, moves between steps, is put into error status, and so forth. Because a timestamp is included in each record, accurate timing for the movement of workitems can be computed. Because the ordinal number is saved for the routing rule that specified each next step, statistics about how often each routing rule is invoked can be computed. Many other reports can be generated from the information in this table.

SQL Report Generators

Because the software uses ODBC to communicate with the underlying database, administrators have several options for gaining direct access to the data in these tables. The first option permits a user to make direct SQL queries against the database. A query can be either written when needed, or written once and saved for reuse. It queries and produces a table of any information requested, though with limited formatting capabilities.

This option is available because each of the database management systems certified to run with the system provides front end tools. Microsoft's SQL Server includes SQL Administrator, Oracle 7 Server includes SQL*DBL, and Sybase SQL Server 11 includes SQL Advantage.

The second option is to use a third-party SQL front-end tool. Examples are Q+E and Microsoft Access. These programs are often designed for users who are not proficient in writing SQL statements. They provide more options for specifying the queries and for formatting the output. Each of these tools can use ODBC to connect to the database.

User-Written Processes

It is possible to write a process that runs on the servers and reads information directly from the database tables. Such a process can collect statistics, perform reconciliations, or monitor the status of workitems. It may make calls to the native SQL programming interface, or it may use the more portable ODBC interface. Although the data received from the database might be identical to the output from an SQL report generator tool, a user may choose to perform the query under program control for several reasons:

- That program can make computations, comparisons, inferences, and deductions about the output.
- The data can be reformatted for transmittal to another location, such as the host.
- The data can be more easily compared with data from other sources.
- The output can be formatted into reports as needed.

Backup and Recovery

The architecture of the system distributes the system data across several devices, including workstations, jukeboxes, Workflow Domain Subsystems, Central Administration server, index servers, and the Catalog. Because each part of the system manages different types of data (some necessary for recovery and some only transient), each part also has different requirements for backup.

Workstation

It is not necessary to back up work on the workstation. The Workflow Domain Subsystems is responsible for keeping track of work that is forwarded to a user at a workstation and for rescheduling that work if the user's connection disappears without completing the work.

When a user logs off, a desktop list is written to the Workflow Domain so that at the next logon the user's desktop and database will return to their previous state. Even if the user moves to a different computer, the same workitems will appear on the user's desktop.

If the user does not or cannot log off, this desktop list is not available at the Workflow Domain, but it is still possible to reconstruct the list from data stored on the workstation hard drive, provided the user can log back on at the exact same machine. If the user cannot log on at the same machine after not logging out, some of the desktop list can be reconstructed from the Object tables in the Workflow Domain. In any case, there is no need to back up data stored at the workstation.

Workflow Domain Subsystems

All workitems are stored as files in special directories on the Workflow Domain Subsystems. Assuming they are written to optical disk immediately after commitment, there is no need to back them up, because they can be restored from the archive.

The remaining server data is in the database. The database can usually be recovered after a sudden shutdown; however, it is wise to have a backup copy. Even when the backup copy of the database must be used, application of the transaction log (a process known as "forward recovery") brings the database up to the last completed transaction.

TheWorkflow Domain Subsystems can be configured with internal magnetic tape drives that store more than 100 MB on a mini data cartridge tape. This is often more than enough capacity for the entire database to be written to a single tape. In such instances it is possible to have the tape software automatically back up the information in an unattended fashion after hours.

Server recovery is done by restoring the database and then running the OBJRECOV utility. This is a reload utility that downloads all objects in the database from the image archive. Refer to the *Utilities Reference Guide* for more information. DAT tape drives, which have an even greater capacity (2.3 GB per tape), can be used to back up the entireWorkflow Domain Subsystem. Recovery with a DAT drive can consist of simply restoring the entireWorkflow Domain Subsystem.

Database backup can occur while the server is running. It does not need to be brought down to export a database. Batch files are used to export the database automatically to magnetic disk storage, after which, it can be copied by the tape backup software. In such cases, the exported database is kept on temporary magnetic disk storage.

The configuration of magnetic storage can often reduce the frequency with which tape backups are necessary. The use of RAID 5 technology can increase the availability of the magnetic storage. In some cases, just exporting the database to a separate physical disk drive in the same machine may provide sufficient redundancy.

Central Administration Repository

The Central Administration Repository captures all enterprise data that is defined using the Central Administration Console. The repository includes information about the system's enterprise, workflow Workflow Domains, servers, forms, classes, users, and other data.

The general backup and recovery procedures described for the Workflow Domain Subsystems also apply to the Central Administration Repository.

Archive and Request Manager

The Archive Manager keeps track of the optical disk platters mounted in the jukebox. It is not responsible for the contents of the optical disk platters. That information is in the Catalog.

Accordingly, it is not necessary to back up the image Archive Controller. If necessary, the controller can inventory the jukebox and read the volume labels off the platter.

Information that is written to an optical disk platter is copied periodically to a duplicate optical disk platter. The duplicate copy is identical and, after it is completely written, may be stored in a second jukebox at a remote location or moved off-site.

The database on a machine running Request Manager does not need to be backed up. Remote requests are also stored in the Transfer Manager that made the request and are resubmitted when Request Manager is available again. User requests are resubmitted when the user checks to see whether the request is fulfilled.

Catalog

The Catalog keeps track of all objects in the archive, whether on optical disk platters or magnetic disk drives.

The information in the Catalog is critical and must be backed up regularly. (The Catalog can be rebuilt by reading the optical disk platters or magnetic archive, but this is very time consuming.)

Storage Manager

As an alternative to Archive Manager, Storage Manager can be used to store workitems to magnetic disk. All workitems that comprise Storage Manager document families must be backed up to tape or other medium on a regular basis.

The following Storage Manager files must be backed up:

- Archived workitems
- Work pending but not yet archived
- Relational Catalog data.

Transaction Processing Considerations

An image-enabled transaction processing system often has a large volume of data and multiple Workflow Domain Subsystems. The system was specifically designed to ensure that the ongoing backup procedures for such an environment are as simple as possible.

The system normally writes image documents to optical disk at the beginning of the processing flow, that is, immediately upon commitment.

The high-speed scanner can be configured to transmit them twice, once to an image archive and once to a Workflow Domain Subsystem. At the image archive, the document is written to optical disk and a transaction updates the Catalog with the physical document location. If the Catalog is unavailable, then the image archive will retry the transaction at a later time. The image archive also updates the Catalog after duplicating an archival platter.

At theWorkflow Domain Subsystems, meanwhile, documents are routed for processing at workstations. After completion, the document might be sent to a deletion step in the workflow. If so, the deletion process checks the Catalog and does not delete the object if it is not in that database. If necessary, theWorkflow Domain Subsystem archives the document before deleting it.

If an enterprise is configured to perform this sequence of events, there is no need to back up the images on aWorkflow Domain Subsystem. All images can be restored from the image archive; only the server database needs to be backed up. Compared to the workitem storage, the database on theWorkflow Domain Subsystem is relatively small. A server with a work-in-progress inventory of 20,000 documents may need 1 GB of storage for the images alone.

The database, however, contains only 20,000 rows each in the Queues table and the Object table. Because such servers often have two physical hard disks, an exported SQL database can be kept on the second physical hard disk. If the first hard disk fails, the database is restored from the exported copy. If the second hard disk fails at the same time, the images are reloaded from the image archive.

Glossary

A

Admin Console
See Central Administration Console.

annotation
A type of markup, similar to a note, that is attached to an image page, and displays the free-form text.

API
An acronym for Application Program Interface.
(1) Documented method by which one program can request services from another.
(2) Any language and format used by one program to help it communicate with another program. The APIs enable programmers to repackage, recombine, or integrate parts of an imaging system application with other applications, and to customize the user interface.

APPC
An acronym for Advanced Program-to-Program Communications.

archive
(1) A component of the imaging system used for long term storage of workitems.
(2) To copy a workitem to the archive.

Archive Controller
A PC and the associated software that controls a physical jukebox device.

archive workstep
An InfoImage workstep at which the processing results in sending workflow items to the Archive Controller for archiving.

attachment
A file in a non-native format that is linked to a workitem. See also imported item.

Attributes Table
A relational database table that stores index data for workitems. The table contains one row for each workitem currently indexed in the domain, a column for workitem ID, name, class, type, and the Workflow Domain Subsystem on which the workitem is stored, and columns must be added for each index form field identified in a form's SQL view).

autofoldering
A process that converts batches, created by scanning, into folders and then introduces the resulting folders into the workflow.

automatic indexing
A task performed by an Optical Character Recognition (OCR) server that involves extracting data from a document image and writing that data to the related document form. The connections between the document image and form are defined using Forms Creator.

B

background task
In a computer that can execute more than one task at a time, a low priority task that does not require user interaction to execute.

backup
(1) A duplicate copy of data or files.
(2) The process of copying data or program files to a secondary storage location for the purpose of loss prevention.

backup volume
An optical disk volume to which archive data from the primary volume is copied.

barcode
A labeling system that uses a series of vertical bars and spaces to represent alphanumeric characters.

batch
(1) A group of paper documents prepared for scanning.
(2) A workitem that contains these documents, that is usually produced using a scanner, and that exists until the documents enter the workflow.
(3) A collection of image pages or uncommitted documents logically grouped for high-volume document entry processing, that are tracked together until stored on magnetic or optical disk.

binding
An action performed in Forms Creator in which you associate a form or form fields with data entry zones or areas to be read by OCR, or you associate a form field with a logical name that corresponds to a database column in the Attributes Table.

bitonal
A quality of an image that indicates the image is composed to two colors, generally black and white.

C

CAC
See Central Administration Console.

cache
The storage area on a computer that keeps data readily available for rapid and repeated retrieval.

CAL
An acronym for Client API Automation Layer.

candidate
A workitem at a Rendezvous workstep that is filed into a rendezvous folder according to match criteria.

Catalog
A database responsible for maintaining a record of the physical locations of all archived workitems within an enterprise.

CCITT
An acronym for Consultative Committee on International Telegraph and Telephone. CCITT sets international communication standards. CCITT groups III and IV are standards for image compression.

Central Administration Console
A MMC snap-, that provides access to a administrative tools for managing InfoImage enterprise users and data.

class
A named set of characteristics assigned to documents, folders, and imported items.

client
An entity in a client-server system that requests services from a server.

client list
A collection of workitems in use by a client application, that is automatically created for the client application when a user logs on to the InfoImage system.

Client API
An API used to develop custom workstation or server processes, and comprising a set of functions and a viewer.

Client Work Manager (CWM)
A client application of the Unisys InfoImage document imaging system that enables users to convert hard copy documents to electronic images, to view and manipulate images, and to store the images.

commit
To convert a batch into a folder or individual document workitems for workflow processing and storage.

compression
A process that reduces the size of an image file for storage purposes.

Computer Output to Laser Disk (COLD)
A method of storing text data such as reports in optical archives.

connection
A link between two worksteps that indicates the flow of workitems between those worksteps.

consolidated server
A single server that results from merging one or more previously existing Workflow Domain Controllers and their associated Workflow Domain Subsystems.

custom variable
A workitem variable defined using the Workflow Designer. Formerly caller a user key. See also system variable.

custom workstep
A workstep where the processing is performed by a workstation user or by an automated client process. For example, the processing may be data entry, data verification, or problem resolution.

CWM
See Client Work Manager.

D

data entry form
A form used to record coded data, and used to index a workitem, record a transaction, route the workitem, or pass data to a mainframe application.

data entry zone
An area on an image page associated with a form field. Image data in the zone is highlighted as the user tabs between fields.

data set name (DSN)
A name used to provide an interface to ODBC drivers for the purpose of conducting database queries or modifications. Also called data source name.

DBCS
An acronym for double-byte character set.

DBMS
An acronym for Database Management System.

default workset
(1) A workset associated with a resource's logon information, used to direct the resource to the appropriate server at logon time. For a High Performance Workstation user, this is the only available workset.
(2) A workset selected by a Document Management Workstation (DMWS) user for automatic display whenever the user opens the Inbox.

desktop
A client workstation viewer that displays workitems and tools.

desktop tools
A component of the client workstation software that provides a discrete set of features. Examples include the File Cabinet and the Inbox.

digitize
(1) To convert an image into digital data, usually by scanning.
(2) A technique used to lighten an image by forcing every other pixel to be white.

DLL
See dynamic link library.

Domain Name Service (DNS)
A service that maps TCP/IP numbers such as 123.12.4.245 to a more easily remembered name, for example, www.unisys.com. When a user types www.unisys.com in a browser, the browser goes to the specified DNS server to locate the matching TCP/IP address.

document
A kind of workitem that holds references to one or more attachments, including image pages, imported images, or notes. Each document is assigned a document class and has an associated document form.

document class
A common set of scanning and index characteristics assigned to documents, created by a system administrator and assigned to a batch or document by the user.

DPI
An acronym for dots per inch.

drop out ink
Ink color that is not recognized by scanning devices and therefore excluded from a scanned image.

DSN
See data set name.

dynamic link library (DLL)
A library containing program code written using conventions that enable the code to load and execute at run time.

E

electronic file cabinet
A system of digitally storing documents and folders for retrieval using computer software.

encryption
The process of obfuscating plain text into data that is not meaningful to the user. Passwords are encrypted when stored in InfoImage.

enterprise
A logical grouping of one or more Workflow Domains that shares the same Catalog and Central Administration Console.

Enterprise Indexing
An InfoImage software component that enables to perform index queries and retrievals against enterprise-wide resources.

error workset
A workset that selects workflow items with an ERROR work status. For example, workflow items with an error status of Rendezvous Multiple Match or Rule Action Failed are included in such a workset.

Ethernet
A common local area network (LAN) protocol, specifically IEEE 803.2, that provides a communication facility for high-speed data exchange between computers and other digital devices.

F

Fax Manager
An InfoImage software component process that controls fax-in and fax-out operations.

File Cabinet
A desktop tool that enables users to specify the batches, documents, and folders to query and retrieve from storage to you're a client workstation.

folder
A kind of workitem that contains subfolders, documents, attachments, and notes, and includes an associated form related to a workitem class.

form
A set of structured data associated with a workitem, used to maintain standard information about that workitem. This information may be used to index the workitem, process a business transaction, or provide values for workitem variables. A form consists of a form definition created using the Forms Creator and form data supplied by a resource, and displayed in a form window on a client workstation.

form data
A collection of coded data values associated with a workitem. The content and structure of form data is specified in the form definition.

form definition
A structured collection of form fields, created using the Forms Creator.

form field
A container for a single data value, having characteristics such as a name, size, and edit and display functions.

form view
A subset of fields on a form, that enables the restriction of user access to certain fields on a form. For example, on a form that contains an entire customer record, a form view enables some users to view specific parts of the customer record, while other can view or update all or different information in the customer record.

Form Viewer
An InfoImage program that displays forms while using Client Work Manager. The Form Viewer also runs in standalone mode to test new forms before installing and using them on the system.

Forms Creator
An InfoImage software component used to create, design, and manipulate forms and form views.

forwarding
The act of sending a workitem from the current workstation to the next processing step . Contrast with releasing.

FTP
An acronym for File Transfer Protocol.

G

Gather Robot
A robot program used in a route to gather all related workitems in a Workflow Domain . For example, you might use the Gather Robot to collect all workitems related by a specific index field of indeterminate number into a folder.

grayscale
A range of values representing graduated shades of light and dark.

group
A set of items with common attributes, such as a class.

H

high volume scanner
A piece of hardware capable of scanning large volumes of paper documents at high speeds.

highlight
A type of markup, that highlights an area on image page with a contrasting color.

historical record
A full document form that displays both index and non-index data values associated with a workitem when the workitem is committed.

Holdbox
A desktop tool on the High Performance Workstation that enables the user to retain a workitem locally for later processing. The Holdbox also serves as the user mailbox.

HSM
An acronym for Hierarchical Storage Management.

host system
A mainframe or other large computer accessed by workstations and servers.

Hosts file
A file used by Windows to map IP (Internet Protocol) addresses to host system names. Hosts files are typically used for small network installations where there are no WINS or DNS servers on the network.

I

icon
A small graphic representation of an image page, document, folder, application, or tool.

ID
A unique, system-generated identifier for a workitem. Every workitem has both an ID and a name.

image
An electronic representation one side of a piece of paper. Also called an image page.

image document
A workitem that contains one or more image pages created using a scanner, received as a fax, or generated from a mainframe print stream, that can be viewed and annotated, but not altered.

image overlay
A file that contains the format and structure of a form, and superimposed over an image page for viewing. An image overlay is stored as a separate file from the image page. A paper document can be printed with special dropout ink, then scanned without the form structure. When a user retrieves the image for viewing, the image overlay is superimposed on the image to provide the form structure and form data.

Image Server
See Workflow Domain Subsystem.

import class
A class assigned to imports.

import
A type of attachment, stored in a document or a folder workitem, that requires an external application to read, display, or change the data.

imported image
A type of attachment, imported from an external source, in a native format..

Inbox
A desktop tool used to receive and select workitems from a workset.

Inbox view
A form view that defines the form fields to display in the Inbox at configured worksteps. This view must be named INBOX.

index
To assign values to a workitem for the purpose of retrieving the workitem later.

index form
A form used to record index data used to locate a workitem.

Index Manager
An InfoImage software program that maintains index information for workitems in a Workflow Domain.

Index server
A computer that runs the Index Manager software.

index table
A synonym for Attributes Table.

index value
A constant or quantity assigned to a workitem during the data entry process.

InfoImage Configurator
A user interface that enables you to add and modify both the domains and the Workflow Domain Subsystems on a consolidated server.

InfoImage
A suite of Unisys components that enables the automation of document processing, storage, retrieval, and management and workflow management. InfoImage is a trademark of Unisys Corporation.

initial
A type of markup, that is a system-generated text message, attached to image page, that displays the creation date, time, and creator user ID. Initials cannot be changed. .

Internet protocol (IP)
The client-server TCP/IP protocol used on the World-Wide Web to exchange HTML documents. It conventionally uses port 80, and is expressed as http for a regular web site, or https for a secure web site.

L

lock
To reserve a workitem for the purpose of changing the notes, markups, or contents. No other user can alter a reserved workitem until the lock on the workitem is released by sending it to the next workstep.

M

macro
A custom Visual Basic program that runs from a toolbar or from a menu option.

map
To associate zones on an image with zones on a form. The form can be part of the application, or it can reside on another computer.

markup
A graphic or textual object placed on an image page. Markups include annotations, highlights, stamps, and initials.

MET
An acronym for Media Error Table.

MMC
An acronym for Microsoft Management Console, which provides a common look and feel for all console applications, such as the Central Administration Console snap-ins and the XML Gateway snap-in.

N

native import
A file imported into a workitem that Client Work Manager can read and display.

native format
Any file or page format that Client Work Manager can read and display.

non-native format
A file format that requires another application such as Microsoft Word, Microsoft Excel, or Adobe Acrobat, to read and display the file.

note
A textual object that contains information associated with a document or folder workitem. Contrast with a markup.

O

object
A unit of storage the represents the objects found on a real desk. An object can be a batch, a document, a folder, an image page, a note, or an annotation.

OCR
An acronym for Optical Character Recognition.

OCR zone
An area on an image page that tells OCR software the image coordinates associated with a given form field.

Object Manager
An InfoImage server process that handles requests to retrieve workitems and maintains the Object table, providing a record for each workitem residing on a physical server.

Object table
A relational database table that contains a record for each workitem on a Workflow Domain Subsystem.

ODBC
An acronym for Open Database Connectivity.

Outbox
A desktop tool used to view a list of workitems forwarded during the current Client Work Manager session.

P

pixels
The dots, squares, or cells that constitute an electronic image displayed on a computer screen.

Prefetch Robot
A robot program used in a route to collect all documents into a Workflow Domain that related to each workitem retrieved from a specific workset.

Print Manager
An InfoImage software component that provides printing services for a Workflow Domain.

Q

query
(1) To search for workitems in a Workflow Domain or enterprise based on workitem name or index field values.
(2) A form that facilitates searching the database for a workitem. See also query form.

query form
A form that searches for batches, documents, or folders in the File Cabinet.

queue
A list of workitems awaiting processing at a workstep. Users draw work from a queue by connecting to an Inbox queue workstep, automatically retrieving work from the front of the queue, or manually selecting from the entire list of workitems in a queue.

Queues table
A relational database table that contains a record of every workitem in the workflow.

R

releasing
The act of moving a workitem from the current workstation back to the Inbox from which it was taken. A user might release a workitem if the workitem is not ready for forwarding.

request
A workflow item generated to initiate the processing of the referenced workitem. A request is added to the queue for the workstep where processing will be performed.

Request Manager
An InfoImage software component that provides retrieval optimization for a pool of Archive Controllers.

reserve
To obtain exclusive modifications rights to a workitem. See also lock.

reserved workitem
A workitem for which a resource has exclusive modification rights. A resource can reserve or unreserve a workitem.

robot
An automated client program that uses the Client API and CAL objects to retrieve, manipulate, and send workitems into workflow. A robot can be configured and written to perform a common but tedious manual task.

Robot Manager
A program that provides a graphical interface to manage the robot programs you use as part of an InfoImage system. See also robot.

role
A set of rules that defines how each InfoImage desktop looks, and what activities a user can perform. A role includes the queues, views, and security privileges assigned to a user or group. A user might be assigned a single role, or multiple roles. A system administrator defines and administers roles. A user operating in a specific role inherits the properties of the role.

route
A specific workflow that runs on a Workflow Domain. The primary characteristics are the description of worksteps and the connections between them.

S

Server Consolidation Tool
A utility that consolidates data from several smaller servers into one consolidated server. For example, you can consolidate the file system, registry, database, and InfoImage applications on one server.

SQL
An acronym for Structured Query Language, a standardized language used to define and manipulate data within a relational database.

SQL view
A form view used to define which fields to copy to the Attributes table when indexing a workitem. This SQL view must be named SQL.

stamp
A type of markup, consisting of a graphic such as a check mark or representation of a rubber stamp, attached to image page.

SYSDELETE
A command that enables a system administrators to delete unwanted workitems from a Workflow Domain.

SysDelete Robot
A robot program used in a route to attach to a named workset, and perform a SYSDELETE command on every workitem retrieved from its workset.

system variable
A variable predefined by the workflow system. Examples include Priority, Class, Classes, and Workflow Entry Time. See also custom variable.

T

TIFF
An acronym for Tagged Image File format.

Transfer Manager
An InfoImage software process that runs on each Workflow Domain Subsystem to monitor system worksteps.

U

unified logon
A configuration mechanism that uses the Windows user ID and password to automatically log a user on to InfoImage.

user exit routine
A customized programming routine that provides special processing capabilities, such as multi-field validation or mainframe database access.

V

VBA
The Microsoft common language for manipulating components of its Microsoft Office suite. It is used as the macro language for these applications and is the primary means of customizing and extending them. A VBA program operates on objects representing the application and the entities it manipulates, for example, a spreadsheet or a range of cells in Microsoft Excel.

view
See form view.

view type
A basic structure of a form view. To create a view, first select a view type to determine how information will be arranged and formatted. For Client Work Manager, the view type is always a table.

W

workflow
(1) A collection of all the ways in which workitems can move through an organization, the processing and routing of work from workstep to workstep under program control.

Workflow Domain
A logical group of InfoImage components that generally form a departmental processing unit within an enterprise, runs a route specific to the processing unit, and communicates with a single Workflow Domain Controller. Formerly called an InfoImage Domain.

Workflow Domain Controller
One Image Server Instance within a Workflow Domain that provides certain control functions, such as logon and load balancing, for all Image Server Instances in that Workflow Domain. Formerly called a Domain Controller.

Workflow Domain Subsystem
A collection of services running on a server that comprises the main engine of a Workflow Domain and provides workflow and workitem management services, including Kernel, Transfer Manager, Object Manager, Route Manager, and other service. A Workflow Domain Subsystem is sometimes called a Workflow Server, an Image Server, or an Instance.

Workflow Entry attribute
A setting that identifies a workstep as one where users at a Document Management Workstation (DMWS) and custom Client API processes can enter workitems into a workflow. A system administrator defines which worksteps with this attribute are available to each user.

Workflow Server
See Workflow Domain Subsystem.

workgroup
A collection of individuals working together on a task. Workgroup computing occurs when all the individuals have computers connected to a network that allows them to send e-mail to one another and share data files.

workitem
A container that holds objects or other workitems. You can index, store, and retrieve a workitem. Workitems include folders and documents. Every workitem is associated with a data form that holds index data and has a name and a unique internal ID recognized.

workitem class
See document class.

workset
A set of instructions used to select, sort, and set views for workitems drawn from a queue.

workstep
The definition of the type, pre-processing rules, processing, post-processing rules, and worksets associated with a queue of workitems. Worksteps depicted in route maps are represented by named icons.

X

XML
An acronym for Extensible Markup Language, a pared-down version of SGML, designed especially for Web documents, and used by designers to create customized tags that enable the definition, transmission, validation, and interpretation of data between applications and between organizations.

XSL
A World Wide Web Consortium (W3C) standard defining style sheets for (and in) XML.

Z

zones
See data entry zone and OCR zone.