



PageCenter[®] Architectural Overview

Enterprise Output Management Series



LRS[®] Technical Paper



According to a recent study by a major printing hardware vendor, the average company spends up to three percent of its revenue on hardcopy output. While this figure represents a considerable amount of money on its own, these direct costs only tell half of the story. Over the course of the document life cycle, Gartner Group and Cap Ventures estimate the total cost to be between 8-15% of company revenues.

Companies can save large sums of money by viewing reports online instead of printing them — sometimes running into the hundreds of thousands of dollars. However, not all companies that implement report-viewing solutions obtain the desired benefits. Users and IT staff tend to reject systems that are hard to use, difficult to administer, or impractical to scale.

The PageCenter® solution is a powerful report management and archive system with the ability to flexibly manage who can access reports, how they receive them, and how long to retain these reports. It has the fundamental capabilities to meet enterprise level requirements and the functional elements to gain the acceptance of both administrators and users.

This technical prospectus briefly examines PageCenter's technological foundation, then describes the administrative and user capabilities. The document contains the following sections:

- The PageCenter Approach (architectural overview)
- Fundamental PageCenter Features (performance, security, archive, and more)
- PageCenter Functional Elements (visible business value for users and administrators)

The PageCenter® Approach

PageCenter leverages the renowned reliability and security of the z/OS® platform. PageCenter imports mainframe output (and captures data from other platforms), maintains that output in an online archive, and notifies users that reports are ready for viewing. This browser-based solution works with several popular web servers and scales to support thousands of users.

The PageCenter approach begins with a straightforward implementation and the capabilities to display million-line reports while servicing thousands of concurrent user requests. The archive automatically moves documents to cost effective media based on a retention period and other parameters. PageCenter stores any kind of file, from PDF or Word documents to spreadsheets and technical drawings, and launches associated desktop viewers or applications for use with them.

Organizations may customize the web interface to present their corporate identity including use of multiple languages. Users receive report notification upon arrival, work with data, and add notes to pages for private or group viewing. PageCenter saves users preferences based on user IDs to preserve user-selected look and feel preferences from wherever they sign on.

How PageCenter Works

PageCenter works with VPS® software to get output from the JES spool into the host-based repository. Authorized users view, print, and even save report pages to file as needed. Upon receipt of a report, PageCenter can split and index reports, send email notification containing a link back to a report, and manage short and long-term information storage.

Reports can automatically print at import time or be bundled and printed for a particular recipient. Organizations use DRS and DRS/TCPIP to receive documents and files from many platforms, such as UNIX, Linux, AS/400, and Windows, enabling easy delivery to PageCenter.

PageCenter Web Access accurately presents AFP documents and line-data reports to browsers maintaining a page-like feel, including use of greenbar, if desired. Field-based and full-text searches compliment page-based navigation, providing superior report usability versus hardcopy.

Architecture Overview

The PageCenter architecture separates the import and archive functions, web server function, and client viewing function to increase overall reliability and enable robust scalability.

The following components enable PageCenter to interface with other programs and devices (e.g. VPS, email server, SOAP HTTP client applications, web server, tape drive, etc.) while preserving security and simplifying administrative tasks.

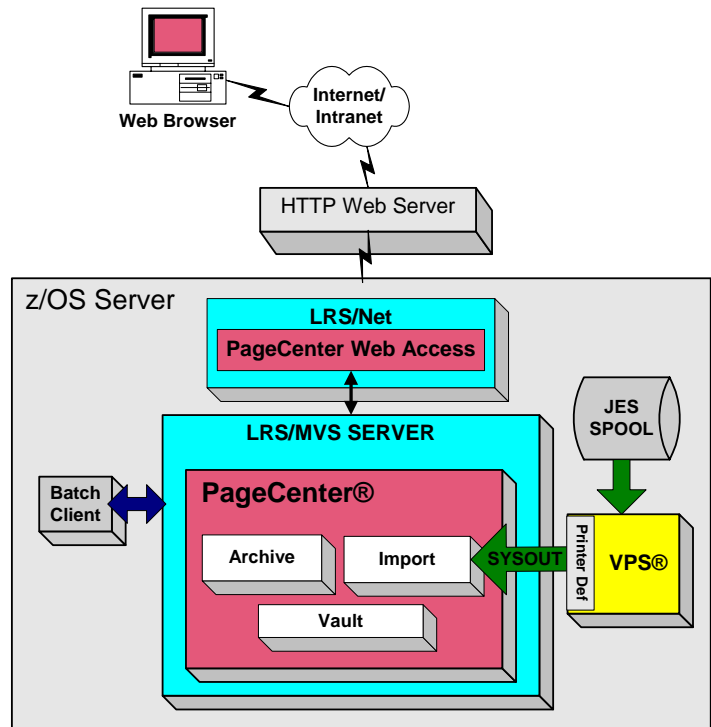
LRS/MVS Server – This program runs in its own address space and handles all client requests. Archived reports are initially stored in VSAM datasets in this address space.

Import – PageCenter imports reports in real-time as they hit the JES spool, making them available for users to view. The import function provides flexible report processing options such as indexing, page filtering, and decollating, as well as performing data compression.

Archive and Vault – PageCenter allocates documents to increasingly longer-term storage levels. Documents are initially stored in a DASD archive level for fast online viewing. Two “vault” storage levels provide longer-term retention, optionally using more cost effective storage media.

LRS/Net – PageCenter Web Access runs in the LRS/Net address space on the z/OS server. The Web Access component presents PageCenter capabilities to a browser client via web server requests. The LRS/Net design separates web application processing from the web server environment to reduce the load on the web server.

HTTP Web Server – The web server communicates PageCenter Web Access client requests between the browser and web server. Several options exist for configuring a web server. PageCenter operates with z/OS, UNIX, or Windows-based web servers. The web server and client viewers connect using TCP/IP.



The PageCenter component architecture



Viewer Clients – PageCenter Web Access presents report data and navigational controls that display in the browser. Authorized users access a report directly within PageCenter or receive email notification containing a link to a report. The user simply clicks the notification link, signs on, and starts viewing and searching for information. The browser-based thin client is easy to deploy to large numbers of users and to diverse remote locations. The client also supports the performance of administrative tasks for authorized users. TSO, CICS, or VTAM clients are also available.

Batch Client – The PageCenter batch client interface provides a means for issuing administrative requests from a z/OS batch job. This client interface is primarily useful for running batch maintenance on PageCenter definitions, the PageCenter Archive Vault Run, and Administrative Reports. A SOAP HTTP interface supports making SOAP server requests via LRS/Net.

Fundamental PageCenter Features

The flexible architecture, robust performance, and other report management capabilities adapt well to a variety of critical business needs. These elements enable organizations to replace an outdated archival system or coexist with an established system. PageCenter enables organizations to consolidate the storage and viewing of legacy report data with report data from non-legacy platforms. This consolidation to a single solution can improve overall access, control, and administration, while eliminating the redundant cost and effort to maintain multiple systems.

PageCenter enables organizations with hundreds or thousands of report users to eliminate millions of printed report pages. Organizations progressively reduce report printing by using PageCenter's ability to invoke user export limits. An administrator specifies a page count limit (applicable for printing or exporting to a file) and assigns that limit to individual users. In this way, an organization could progressively use this technique to reduce their user printing volumes.

To meet an organization's document life cycle requirements, PageCenter provides critical archival and retrieval capabilities that establish and maintain secure access, efficiently control report distribution, and manage underlying print data streams.

The following sections examine some major PageCenter features.

Performance Scalability

A web-enabled online viewing system offers little value if users cannot quickly view large documents — even over a dialup connection. PageCenter Web Access offers maximum speed with effective presentation to provide a very dynamic output management solution.

The PageCenter architecture components scale to meet the demands of thousands of PageCenter users working with hundreds of thousands of report pages. PageCenter exploits a page-based display technique to provide viewing, searching, and navigational support to all those users at the same time.

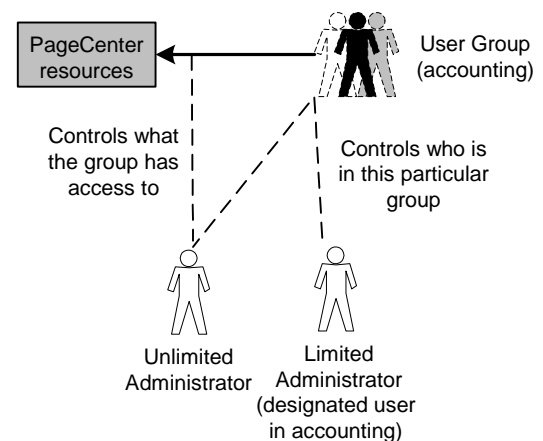
Reports in the PageCenter Archive are compressed and stored in VSAM datasets. As a user navigates through a report, PageCenter is designed to *transfer only the next selected page* of the report. By avoiding the need to deliver the entire report, PageCenter significantly reduces network traffic and quickly displays each page of line or AFP data. This page-based display technique enables large numbers of users to view documents of any size over any connection.

Granular Security

Strategies for allocating administrative and client security vary with an organization’s needs. In some environments, individual corporate divisions perform PageCenter administrative functions and in others, the work occurs within a single IT group. PageCenter security provides ample flexibility in structuring administrator domains, grouping, user access logging, and client controls to support either model.

Flexible Administrative Security – Granular control of authority enables large organizations to establish secure administrative structuring that fits their needs. PageCenter security enables individual administrator functions to be limited. This enables an organization to limit PageCenter administrative functions to specified subsets of resources. Large organizations utilize PageCenter’s support for group-based authorities to allocate departmental control.

Client Access Controls – Every organization that considers granting web-based client access to its host data has concerns about security. PageCenter supports the ability to block unauthorized users from accessing data. Only the intended audience views a report, eliminating potential mishandling of information. The solution also supports preventing users from saving or printing line or AFP data as required.



PageCenter stores all host reports on the mainframe and grants *viewing access only* to authorized users throughout the enterprise. Because the PageCenter Archive exists on the mainframe, user authorization interfaces with external security packages or an internal security facility. PageCenter Web Access also leverages the Secure Socket Layer (SSL) protocol to encrypt all communication between the web server and browser.

Controlled Printing

PageCenter lets users view mainframe reports online instead of printing them on paper. At times, users may need to print a page or small range of pages. Administrative control of users includes the ability to limit page-based exports for printing or saving to a file. Organizations may wish to use this technique to enforce a reduction in user printing and promote increased online viewing.

PageCenter Web Access enables users to print to a local or network printer or route the pages to the JES spool for mainframe printing. Unlike most Web applications, PageCenter Web Access maintains the pagination and layout of reports when printing to a local Windows defined printer.

Support for Mainframe Output Data Streams

The PageCenter design provides AFP viewing capability and takes advantage of the Advanced Function Presentation (AFP) architecture. The AFP architecture manages print resources, such as fonts and overlays, as separate resources so applications do not have to embed document formatting with the report data.

When PageCenter imports host reports from VPS, it stores AFP resources separately from the data. This enables PageCenter to “fingerprint” the resources, ensuring that individual resources are efficiently archived for use with associated reports. PageCenter gains better storage efficiency by saving a common resource, such as a logo, just once while presenting it for viewing whenever required. New versions of a resource are stored only if they change.

PageCenter uses resource ‘fingerprints’ during import to make sure the resources used to view a document match the resources used to print the document. If users need to view invoices from six months or six years ago, PageCenter displays the original invoice overlay with them. If a user needs to print a page or two of the document, PageCenter ensures the resources match the original.

PageCenter utilizes the AFP architecture to maintain accurate viewing of archived AFP documents. Many users who need to view AFP documents online — customer service representatives, for example — require the ability to view the document online exactly as it was printed. PageCenter Web Access delivers that level of viewing accuracy.

AFP print resources remain separate from the data. PageCenter takes advantage of this to cache common resources during a web browser session. To present each new page, only the new data requires downloading. This enables extremely rapid page display. Whether a document contains four lines or four million lines, users are able to search through a document quickly, even if they go directly from the first page to the last page.

Support for Distributed Output Data Streams and Files

PageCenter archives and manages any kind of saved file or file passed through a print driver. In addition to AFP, line data reports, PostScript (PS), and PCL, PageCenter stores and retrieves saved file such as PDF, TIFF, MP3, as well as application files like DOC, XLS, and so on.

PageCenter has the capability to archive documents from various platforms. The LRS/Queue clients transmit files and apply attributes for use in PageCenter processing. The solution manages distributed output and files providing the following capabilities.

Capture and Processing – PageCenter manages the appropriate description, retention, and distribution properties for files. Applications on various platforms send output and files using LRS/Queue clients. Users send print files by printing to a “virtual” Windows printer configured to use the LRS/Windows Port Monitor. Another option common to all platforms is to capture Line Printer Requestor (LPR) data. DRS/TCPIP receives the output/file and places it on JES, where a VPS printer can assign attributes and transmit it to PageCenter. Host output created using VPS/PCL and VPS/PDF automatically assigns file type and attributes for use in PageCenter.

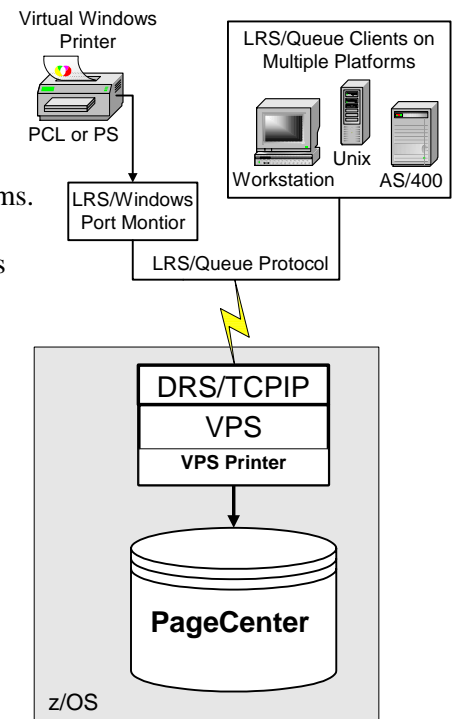
Viewing – PageCenter launches existing applications on the local workstation to allow viewing of associated file formats. Example file types are Microsoft® Office (Word, Excel, etc.) and Adobe® Reader® (PDF).

Printing – The application associated with the file type allows printing on demand.

Local Saving – PageCenter permits an authorized user to save a local copy of a file onto a local workstation based on the capabilities of the associated application.

Flexible File Support – PageCenter supports any file type, enabling organizations to integrate new file types and add application viewer support on local workstations.

Long-term Storage – Organizations rely on this simple-to-use archive to ensure retention and retrieval of all their valuable types of output and files.



Capturing output from non-host platforms



Multi-level Archiving

PageCenter stores reports in a host-based, multi-level archive structure that combines online and offline storage. Administrators can set up PageCenter to move expired generations automatically with the arrival of the latest generation. Organizations choose their own balance between speed of access, retention period, and storage media cost at the per document level.

Initially, PageCenter stores new documents in archive level-0. Three levels are available:

Level-0 (Archive) – The archive level provides fastest access to data for viewing and reprinting. Permanently mounted disk (DASD) storage is used. Adding another VSAM file to the pool increases the archive size.

Level-1 (Vault) – This level provides short-term storage for reports that are no longer current, but may need to be accessed quickly. Organizations choose between fixed disk and tape storage media.

Level-2 (Vault) – This level provides long-term storage for reports that rarely need to be accessed. Organizations typically choose a tape storage medium.

A PageCenter administrator specifies age and vault file quantity requirements to automate moving a document offline to longer-term storage. Organizations usually limit the time that reports are available for online viewing and reprinting, and then move them to a vault for longer-term retention. Using their browser, an authorized user can request PageCenter to restore a vaulted report. However, PageCenter administrative rights are required to perform the actual restore of a vaulted report.

PageCenter Functional Elements

PageCenter provides visible business value for users and administrators. This solution truly helps managers, accountants, bank tellers, customer service employees, and countless others do their jobs. Several functional elements contribute to the ease of both administrative and user operations with PageCenter. A VPS administrator sets up document delivery to PageCenter by creating a VPS printer definition. PageCenter administrators perform setup tasks like assigning of user authorization, security, and document indexing with point-and-click ease. Report documents are automatically broken into subsets of any granularity (e.g. departments or branches) with recipients automatically receiving email notification containing an optional link to their report. Once set up, few additional administration tasks remain besides adding of more users or reports.

Many users have noted that few (or no) printed reports remain laying around their desk and online user notes replace sticky notes on printed pages. Additionally, multiple language customizations make it possible to use across multiple countries or regions.

From the intuitive user interface and elimination of wait time for report viewing, to the powerful administrative methods and processing options, this solution makes online report management productive for all.

The following sections describe some major PageCenter functional elements.

Ease of Navigation

The intuitive presentation and user preferences make report navigation simple and engaging. Users point and click to inspect groups of reports and click on an entry to start browsing a report. PageCenter toolbars enable users to navigate levels and go back to the main page. Toolbar buttons launch searches, zoom out to view 132 character-wide screens, add notes, and more.

The viewer presents reports while maintaining the page-based look and feel. Primary navigation includes page up and page down, first or last page buttons, and page number selection. Users can also use page notes to serve as a bookmark for reference and group work activities. The appearance of a



“sticky note” icon indicates that a report note exists for that page. Users perform text-based and indexed field searches. PageCenter highlights found results and enables users to review all results.

Real-Time Report Access

Because PageCenter receives reports directly from VPS, users are able to view information as soon as it is generated. Reports are delivered in ‘real-time’ to the archive and are immediately available to users. Normally, a report is made available for viewing in less time than it would take to print it; eliminating all the handling time. No batch processing or manual file transfers are necessary. Additionally, when email notification is set up, users are informed immediately when their report becomes available. The email can include a link to log on to PageCenter and view the report directly.

Ease of Administration

The PageCenter Web Access client leverages the graphical web-based interface to provide ease of use and intuitive navigation when performing administrative tasks.

When decollating a large report for several departments, an administrator defines specific table entries for each department. PageCenter also makes it possible to define one generic value to handle each department. PageCenter supports use of distribution instructions to dictate how to store an imported document, how to index the document, and which users have access to it.

Administrators apply parameters to a single document, logical group of documents, all documents on the server, or for all documents in the system. If a report definition is incomplete at the document level, corresponding fields in the higher-level application definition supply the missing information. When necessary, global default values provide system definitions.

Flexible Report Processing

PageCenter can perform the following page-based operations on a report-by-report basis during import. After import, Page Printing and User Notification can occur for archived reports.

Page Filtering – PageCenter removes pages out of a line-mode document based on values contained in the data. For example, a filter discards pages containing application statements used to generate the report.

Page Decollation – PageCenter breaks line reports into individual pages. The decollation process assembles pages with similar data into logical page groups for distribution. For example, an organization decollates a report by department, allowing each department to view only its portion.

Page Archival – Each document or page group routes to the archive automatically.

Page Indexing – PageCenter can populate up to eight index definitions per document, including three key values per index. Users specify index values for fast searching of document index definitions. Index references may occur within the one document or across several documents.

Page Printing – Administrators can specify that all or part of a document be routed to a JES or network printer. Administrators also specify page export limits and bundling options for specific recipients.

User Notification – Notification is sent to PageCenter mailboxes, printers, or email addresses and can contain a link to the report.

There are additional PageCenter processing options for customizing distribution instructions.

Automated Print Bundling

Even with a report viewing solution in place, some organizations need to print bundles of reports or report generations for specific recipients or locations. PageCenter offers a bundling feature that accumulates specified reports and automatically prints them on a scheduled or requested basis.



PageCenter Statistics

PageCenter has extensive capabilities for logging statistics. Organizations regularly utilize information about report viewing, report printing, and restoring of reports. This statistical data provides complete usage information, which is also useful for auditing and chargeback purposes. This feature is useful in identifying seldom-accessed reports to decrease printing and processing.

Migration Process

Customers may have existing archive data to convert for use with PageCenter. LRS can assist with this process as requested. An LRS representative can address migration options.

Integrated Archive and Retrieval

PageCenter integrates archive capabilities into the LRS Enterprise Output Management environment. Viewing and distribution work seamlessly with industry leading VPS capabilities.

Summary

PageCenter provides tangible value for users and administrators. The architecture enables organizations to rely on PageCenter while the built in flexibility addresses a variety of business needs. This solution brings simplicity to both administrative and user operations. PageCenter customers worldwide store millions of pages of information and support thousands of users.

With continuous enhancements and a long-term view, PageCenter is a solution you can trust to meet your needs today and tomorrow.

Get More Information

An LRS PageCenter specialist will be happy to discuss your organization's needs. Additionally, view an interactive product demonstration by visiting our website at: www.vps.com and selecting **Solutions | Product Demos | PageCenter Web**.

About LRS

Levi, Ray & Shoup, Inc. is the industry leader in Enterprise Output Management products—our software runs on more than 5,000 Enterprise systems worldwide. Founded in 1979, LRS is now an information technology firm of 500 employees offering a variety of products and services. We developed the first software that enabled the MVS mainframe to distribute output to printers outside the data center, and today our Enterprise Output Management family of software products provides output distribution, data stream conversion, monitoring/control, and viewing/archiving.

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