FIZ AutoDoc

– a comprehensive solution for access to documents via corporate intranets and web portals

Ahmed Rahali, Thomas Bausenwein
FIZ Karlsruhe, Karlsruhe, Germany

Published in
Interlending & Document Supply
35/3 (2007) 131-137
© Emerald Group Publishing Limited [ISSN 0264-1615]
[DOI 10.1108/02641610710780791]
Abstract

Purpose – To explain in detail the service for document supply offered by FIZ Karlsruhe, the options available for its customisation and the interfaces that facilitate its integration into corporate intranets and web portals.

Approach – Descriptive.

Value – A description of a system that is distinguished by its flexibility in the modern and complex document supply environment.

Keywords FIZ Karlsruhe, document supply, information systems, open systems, customisation, intranets

Paper type Case study

Introduction

The efficient design of managed information access through corporate and campus intranets, requires collaboration between networked systems and the integration of information resources. FIZ AutoDoc, a complete service-oriented document supply information system, strives towards meeting this vision by extending its services, their visibility, accessibility and interoperability by means of standardised interfaces. FIZ AutoDoc offers a single point of access to a vast variety of full-text resources available across libraries, publishers and content producers throughout the world. In addition to the standard document delivery capabilities such as rapid resource location, retrieval and delivery, FIZ AutoDoc provides significant flexibility that allows its corporate customers to adapt the process workflow and make it correspond to their desired requirements. The service-oriented aspect of FIZ AutoDoc, through its collection of client interfaces, makes it able to be easily plugged into other information systems such as web portals or intranets. It can, therefore, be loosely coupled with external corporate entities, even those that use incompatible system technologies, to either create composite services, or gain access to its individual functional components. The purpose of this paper is to present FIZ AutoDoc, highlight its highly customisable workflow, as well as address the system’s architectural model and the set of interfaces it provides that facilitate its integration with other existing information systems and services.

FIZ Autodoc presentation

FIZ AutoDoc offers access to a wide range of conventional and non-conventional full-text literature from all fields of science and technology, published worldwide. It partners with international full-text suppliers and content producers in order to fulfill document supply requests of any kind, ranging from journal articles to patent literature as well as other publications such as reports, books, conference proceedings, etc. (Detemple et al., 2005)

FIZ AutoDoc offers a number of delivery formats, ranging from online digital formats to offline hard print copies. Digital formats include, standard PDF immediately available for download or delivered via email; other copyright-secure, Digital Rights Management System compatible formats such as SDD or SED. [1], [2] Offline hardcopy deliveries range from standard printed copies to clean copies, enhanced (printed) colour copies or faxes. In addition, it offers three levels of servicing: standard, rush and super rush fulfilled within 48 hours, 24 hours and 3 hours respectively. [3]

The FIZ AutoDoc process is highly automated. Full-text orders are acknowledged and forwarded promptly to the potential supplier for completion. In cases where automatic processing falls short, due to incomplete or inconsistent bibliographic data, ambiguous literature, rough citations that led to manual orders, or simply offline order requests, FIZ AutoDoc has a competent service team to provide the required assistance. The team of bibliographic experts interacts directly with the customer to effectively handle these issues and fulfill the customer’s requests.

Upon receipt, all full-text order requests are assigned an order number. This systematic unique identifier tracks the order through the system. The order’s data, its status, its supplier as well as details related to the shipping entity can be tracked at any stage. Additional external identifiers and references can be defined. This feature is of great benefit to corporate customers, who assign cost centres or other (free-text) references to their corporate end-users and require that these identifiers are automatically passed and attached to order requests. These identifiers also remain viewable, traceable and searchable throughout the system.

FIZ AutoDoc for corporate customers has far more to offer. The corporate solution provides for a seamless transition from corporate domains to FIZ AutoDoc through well-specified interfaces based on international standards such as OpenURL or SOAP for Web Services. It can also add a corporate identity to the system’s look and feel, administrating corporate end-users, setting and customising the order workflow in several ways such as incorporating local libraries or open-linking to third parties.

Furthermore, the service provides customers with a convenient billing service with a single monthly collective bill that covers all documents supplied during the corresponding accounting period, independent of the suppliers fulfilling individual orders.

FIG. 1: BUSINESS OVERVIEW
On top of that, FIZ AutoDoc corporate customers have access to sophisticated and thorough billing and order statistics.
The billing statistics cover complete pricing details attached to individual closed orders that have been billed during previous accounting periods, detailed order and requester data, as well as individual cost centres attached to orders at the time of submission. On the other hand, the order statistics do not relate to billing data, and aim to give an overview of all order requests, including open ones, their statuses, types and requester related data.

System architecture
The FIZ AutoDoc application is sound, transactional, multi-user, secured, scalable, and portable, with much of the security, speed and reliability being drawn from the robust server-side technology. The system is based on a J2EE multi-tiered architecture with the intention to facilitate and standardize the development, deployment, and assembling of the application components. Each of the layers that constitute the overall architecture encapsulates a specific set of functionalities.

Figure 2 shows the overall application architecture. The front-end presentation and interface layer is responsible for providing the interface to the application. FIZ AutoDoc provides different forms of interfaces, the most common of which being the browser’s interface for a web or a portal application that runs remotely and accesses the application via standard HTTP or HTTPS. The enterprise middleware layer houses the business process components running on a multi threaded application server. Finally, the back-end layer, sitting on an Enterprise Resource Planning (ERP-) system, customised to meet FIZ AutoDoc’s best business practices, includes the core low-level business logic components, the basic application data sets, metadata and enterprise resources.

The underlying ERP-system is the host to large supplier catalogues as well as publisher document metadata that accurately describe a document’s availability and accessibility. These data are constantly updated, in a semi-automated manner through specific supplier-to-system interfaces.

The ERP-system is also responsible for real-time storage of order request data. It interacts with document suppliers, through an HTTP/SMTP interface layer. This layer defines a channel of communication through which order data are forwarded to the selected supplier on one hand, and on the other hand, order-related updates are absorbed from the supplier’s feedback and reflected on the system. The ERP-system keeps track of the status and change history, together with relevant customer data, such as shipping details, cost centres and/or any order specific reference numbers. It is also the billing platform that handles all accounting operations that concern suppliers and publishers on the one hand and the corporate customers on the other.

The account model
FIZ AutoDoc adopts an account model that adheres to a number of principles. First, a corporate customer can have any number of accounts. Second, the approach in which a set of corporate user identities will be grouped together into a single account is entirely the choice of the corporate customer. An account can correspond to a particular physical site or location, or it can also be a virtual definition of a group of users following a given criteria, such as responsibility or area of interest. Third, an account describes a billing entity; invoicing and all corresponding billing operations such as the billing statistics are performed at account level. Last but not least, an account defines a level of application workflow customisation; all customising options take effect at account level and affect therefore those corporate end-users belonging to the respective account.

Users within an account are assigned roles which are compatible with their level of access privilege. Although the majority of users will be corporate end-users, we distinguish two sets of privileged users, to whom access to extra functionality is granted: administrators and supervisors. Administrators take charge of customising the application by setting account-level preferences, activating or deactivating customisable features, incorporating predefined functional modules and maintain related corporate data sets. Supervisors, on the other hand, are more concerned with the responsibility of monitoring and managing all account-level orders.

Identity management and authentication
Users may authenticate into FIZ AutoDoc in many different ways. Deciding criteria on whether the user requires prior registration into the system is the approach by which the system is accessed. The system supports both explicit and implicit authentication. The former requires a prior explicit registration whereas the latter is an implicit federated identity based authentication process. The service provides an interactive form-based end-user registration tool. Corporate customers to whom a unique identity token is assigned, are able to upload predefined registration data, including organisation entities and cost centre assignment rules. Corporate end-users can therefore, comfortably, with minimum effort register on the system, and cost centres are automatically retrieved, stored and assigned to the user and attached to their future order requests. With this form of registration, end-users are required to choose a login ID and password that will be used to grant them access.

Two-factor authentication that combines the above login ID and password approach with an IP-based validation is also an option. This requires that the corporate organisation has a fixed IP address or range of IP addresses through which, FIZ AutoDoc is accessed by its end-users. IP-based authentication alone can also be the choice when corporate end-users need service access, but not necessarily under
a unique identity. This has the implication that no user personal data, such as shipping address, personal default application settings or cost centres are permanently stored in the system, and consequently, the user is asked to provide this data on access. When integrated within web portals, intranets or other information systems where users are already authenticated within their organisation of origin, FIZ AutoDoc adopts and puts in place mechanisms to support the concept of identity federation. This means that authentication at the external trusted corporate entity, will suffice to identify users and grant them seamless access without them having to re-authenticate explicitly. This provides three key benefits: For the user, it makes the transition of accessing FIZ AutoDoc services as transparent as accessing any local resources. It also frees both the user and system from the overhead of managing multiple virtual identities and authentication information. Finally, the user's data is centrally maintained at the corporate organisation of origin, avoiding the necessity for FIZ AutoDoc to track back any changes related to that data.

One illustration of a federated identity type authentication is the OpenURL interface that will be described later. FIZ AutoDoc aims to extend this mechanism by incorporating the open-source Shibboleth architecture; a common infrastructure to service providers and identity providers, used to achieve cross-domain single sign-on. [5]

Standard workflow

In its simplest fashion, FIZ AutoDoc operates as follows: users, upon successful authentication to the system, place full-text order requests either explicitly by specifying the relevant bibliographic data, or implicitly, by exporting these data via one of the system's available interfaces. In addition to bibliographic data, users choose their desired delivery speed and document format. An automatic bibliographic consistency check follows. For article orders, this includes checking the input against the ISSN register and making any subsequent corrections. [6] The system then automatically searches for a suitable supplier that could fulfil the request as given, and looks up for any immediate download availabilities, also known as “pay per view”, at selected publisher sites. Consequently, users will be displayed details of the availability, including order and shipping data, pricing and copyright information as well as the chosen supplier which they can confirm to submit their request. Alternatives are offered in case the order delivery requirements could not be met. The option to place manual order requests, which will be handled by the FIZ AutoDoc team of experts, is available at all stages if users are experiencing difficulties, have incomplete bibliographic data to hand, or wish to give orders a free-text input. Automated orders are forwarded promptly to the selected supplier. The mechanism of supplier selection considers a number of parameters to ensure that the most appropriate supplier, following specified criteria, is always chosen. For instance, suppliers that can fulfil the order with lower charges, or those that are local to the customer, will certainly have an increased likelihood of selection over other potential suppliers.

Corporate customising options

The modular nature of the FIZ AutoDoc application allows for a high-level of customisation by corporate customers. The application modules correspond to autonomous functional entities that can be activated or deactivated to tailor the application's workflow according to the corporate customer requirements. The customising operations are privileged and are, therefore, reserved to the corporate account administrators.

eJournal linking

The eJournal option, when activated, means that prior to submitting an order to a full-text supplier, FIZ AutoDoc first checks whether the end-user already has an independent access to the journal in question. Corporate account administrators would need to upload an ISSN/E-ISSN list describing availabilities for journals that are electronically accessible to their end-users either:

- via subscriptions at selected publisher sites,
- through back-linking to their local intranet, or
- at independent third parties/aggregators.

When linking to publishers, FIZ AutoDoc works out an article level full-text resource location by means of direct interfaces it has to selected journal aggregators. Back-linking to local electronic libraries or OPACs on the corporate intranet or out-linking to third parties is possible in two ways. Corporate customers can either specify full journal URLs in their eJournal availability list, or alternatively the base-URL of an OpenURL resolver. The former guarantees journal-level linking, whereas the latter is subject to the target's ability to resolve OpenURL for accurate resource location.
Integration of in-house holdings
Similar to the ejournal option, the availability of in-house print document holdings, such as copies at the organisation’s local library, can be checked from within the FIZ AutoDoc ordering process. The corporate account administrator would be required to upload the corresponding ISSN/E-ISSN list that describes the available ranges of the organisation’s local holdings. Consequently, orders are matched against the corporate holdings prior to seeking available ranges of the organisation’s local holdings. In-house orders are forwarded to an email address provided by the corporate account administrator, and are processed by the account’s supervisor who interacts directly with the order requester. Once the in-house order is delivered, declined or cancelled, the supervisor can easily update the order status either online via the web-interface, or via an email interface triggered automatically when replying to the original email with a special header. Declined in-house orders, that cannot be completed by the organisation’s local library, can still be assigned back to FIZ AutoDoc to seek an external supplier, by the supervisor via the web-interface.

In-house library network
Some corporate organisations have a distributed network of libraries, and wish to reflect their in-house availabilities across all their accounts. FIZ AutoDoc provides a comprehensive mechanism that allows the integration of multiple in-house libraries. Moreover, the corporate account administrator can allocate priorities to each of the contributing libraries. For example orders for items that have multiple availability, are serviced first by the local library. The in-house order email that FIZ AutoDoc forwards to the chosen library includes all necessary information such as the resource’s shelfmark as well as listing alternative availabilities at the contributing libraries.

Order processing/reprocessing
Typically, the FIZ AutoDoc service team receives and processes all manual orders. Nonetheless, FIZ AutoDoc provides its corporate customers with the flexibility to choose to process their own users’ manual orders. In a similar way to in-house orders, manual orders are directed to an email destination specified by the corporate account administrator.

Statistical information
The corporate order statistics, referred to earlier in this paper, are designed to provide a detailed overview of all documents ordered via FIZ AutoDoc. They are not limited to orders being fulfilled by one of FIZ AutoDoc suppliers. They include those orders forwarded to the local in-house library or remote library in the corporate network of the organisation; orders that were linked out of FIZ AutoDoc to a resource location at third parties as well as orders that resulted in a direct download from selected publisher sites. The statistics information combine full order data and time-stamped order cycle, with user data, as well as corporate user classification references such as cost centres. They aim to embrace as much information as the system holds, to be consumed as a final value, or to provide raw input data for corporate post-processing and analytical tools.

Supplier/delivery preferences
FIZ AutoDoc offers a wide range of document supply formats and service levels; corporate account administrators are able to choose a subset of preferred delivery combinations. This avoids their corporate end-users ordering formats that are unsupported by the local systems, or a service level whose price is too high.

Corporate visual identity/ interface options
Corporate customers can preserve their identity and brand it within FIZ AutoDoc in a number of ways. For example, their corporate logo can be uploaded and viewed adjacent to the FIZ AutoDoc logo throughout all stages of interaction. Again, external links to personalised help and/or news sites specific to the customised corporate workflow can be put in place to overwrite the standard ones provided by FIZ AutoDoc. Moreover, interactive messages displayed to the corporate end-users, as well as emails automatically sent to the users, can be specified to meet the customer’s corporate identity stipulations.

Interfaces
FIZ AutoDoc offers a set of interfaces which allow the convenient transfer of document information and/or user data from remote systems such as intranets, portals, intranet databases, document management systems and other corporate applications. Two interfaces, relying on international standards, are distinguished: OpenURL and Web Services. They are based on the already existing and well-known HTTP protocol, making them very developer friendly. While their common aim is to achieve seamless integration of FIZ AutoDoc services into remote entities, their approaches are entirely different, offering corporate customers different choices to assess alongside their requirements. OpenURL offers the possibility to couple two different systems at a user-interface level, whereas the Web Services interface allows remote systems to interact directly with the application’s core functional components. FIZ AutoDoc also defines a proprietary Email interface that will be described later.

OpenURL interface
OpenURL is a standard that defines an architecture for context-sensitive linking information systems. It has been endorsed as an ANSI/NISO standard, Z39.88-2004, titled “The OpenURL Framework for Context Sensitive Services”. [7] It is also often referred to as OpenURL 1.0, while OpenURL 01 is its predecessor version. [8] Both versions are widely used for connecting information systems over networks at a user interface level. Objects that define the context in which the two systems are linked to one another are referred to as “Context Objects”. They typically are bibliographic objects defined by metadata sets, and can be transported from an OpenURL source to an OpenURL target system. The target system implements an OpenURL resolver which provides context-sensitive links to the user.
As illustrated previously, FIZ AutoDoc may act as an OpenURL source when linking to ejournals hosted remotely. At this stage, the aim is to describe FIZ AutoDoc as an OpenURL target. The “Context Object” that is transferred via the OpenURL request consists of a number of entities. The service uses three of the six possible entities. The main one of which is the “Referent Entity” that represents a resource, for example a journal article. The OpenURL resolver of FIZ AutoDoc uses the referent data to fill the order form upon successful authentication. Second, the “Requester Entity” describes the identity of the user submitting the request. The data element specific to FIZ AutoDoc is defined in an unregistered requester format. For corporate customer accounts opting for federated-identity authentication, granting access follows implicitly with the OpenURL request, otherwise an explicit authentication step is necessary. Finally, the “Referrer Entity” describes the system that generated the Context Object. The advantage of OpenURL is that it is a widely used standard and it can be relatively easily implemented or generated from a variety of systems. It is also a very suitable mechanism for the automated user identity data transfer, all in one single request.

Web Services / SOAP interface
The Web service interface is a layer that describes a collection of operations that are accessible through standardized XML messaging via HTTP(S). A Web service performs a specific task or a set of tasks. It is described using a standard, formal XML notation, called its service description that provides all the details necessary to interact with the service. These include message formats (that detail the operations), transport protocols, and location. Web service descriptions are expressed in the Web Services Description Language (WSDL).[9] FIZ AutoDoc defines a collection of Web services through an XML-based messaging layer that facilitates communication with remote clients. This messaging layer is based on a protocol referred to as Simple Access Object Protocol (SOAP); an XML protocol that facilitates the communication process across the internet between disparate systems.[10] Each Web service corresponds to a complete workflow transaction, such as authorising a user given their credentials, submitting a fully automated order, bulk ordering, querying the delivery options for a given document, tracking the order history and many others.

FIZ AutoDoc defines Web services for all its functional blocks. Nearly all operations that are performed through a user-to-system interactive step, are also available as single Web services for system-to-system transactions. FIZ AutoDoc describes available Web services to remote clients through WSDL. These descriptions take the form of an XML document providing comprehensive specification for the programming interface and location of the many potential Web Services. WSDL is accessible to remote client systems by specifying its direct URL.

The Web services interface differs from the OpenURL interface in that the web interface with which users interact is on the remote client. The client system has the responsibility for providing the user interface, assembling parameters conforming to the provided WSDL specifications, as well as handling and responses posted back from the FIZ AutoDoc system. This also means however, that customers enjoy a wider freedom with regards to the presentation of the web interface to FIZ AutoDoc.  

Email interface
FIZ AutoDoc provides a lightweight proprietary email interface that allows customers to easily send their order descriptions via emails that meet a set of specific format guidelines. These emails are automatically processed and transformed into regular document orders upon receipt. Having this email interface in addition to the interfaces described above has a number of advantages. Firstly, orders can be simply posted without having to explicitly log into the system. Secondly, emails can contain an array of document orders allowing bulk-ordering with minimum effort. Thirdly, these email orders can be automatically generated at corporate customer sites from any document management system.

Summary/outlook
This paper presented FIZ AutoDoc’s extensive capabilities beyond that of a simple document supply service. It focussed on the system’s flexibility, customisability as well as interoperability that makes it a comprehensive, service-oriented corporate solution. FIZ AutoDoc has always been developed in close co-operation with key corporate customers. It evolves on many fronts in order to meet the stringent demands of today’s e-businesses. First, it keeps up with new proven technologies to strengthen its robust enterprise-class infrastructure and provide high levels of security, management, and quality-of-service. Second, it adopts and supports international standards to achieve a sophisticated scale of interoperability. Last but not least, FIZ AutoDoc continually strives to meet new emerging needs, improve service value and achieve high customer satisfaction.

References


About the authors: Ahmed Rahali is a senior software engineer and Dr. Thomas Bausenwein is the head of FIZ Products & Services in the department Development & Applied Research at FIZ Karlsruhe (www.fiz-karlsruhe.de)