

Danish union catalogue DanBib and library.dk – “physical” and “virtual” union catalogue

Traditionally, large union catalogues (e.g. OCLC's World Cat, and – on a smaller scale: DanBib) are built as physical union catalogues (one single database with copies of participating libraries marc records). But in the end of the nineties – after the functional and commercial break-through of the Z39.50 protocol – the building of larger union catalogues on the virtual model (distributed parallel searches in many local library systems) was discussed by library professionals. The arguments were both economical and political: expected lower cost of maintaining the service and more independence and technological skill in the local computer departments of the union libraries. (1)

This discussion peaked in Denmark in 2002, as “The Battle of the Union Catalogue”. Therefore the Danish National Library Authority – as part of an inquiry on the subject - elaborated three possible scenarios for the future of union catalogue in Denmark:

1. A completely centralized model (one library system for the entire country)
2. A physical union catalogue, but in different variants, including “virtual” elements
3. An entirely virtual model, based on network interconnection (Z39.50) of library systems

A part of this inquiry was an evaluation of the three scenarios, made by some of the professionals, who had expressed various opinions on the subject in the international discussion. In the end, all the evaluators gave their support to scenario two: the physical union catalogue. And that was the conclusion of the Danish discussion – at least for some time. With the remark, that the Danish union catalogue in the future development also should support a decentralized development of ILL-functions, based on the Z39.50-protocol. (2)

In other words:

a physical union catalogue, but with “virtual” elements, when they can improve the value of the service.

Thus the paradigms vary over time! This paper will present the actual and near-future development of the Danish national union catalogues 'DanBib' and 'bibliotek.dk', with focus on ILL. Also in focus is the mix of “physical” and “virtual” elements in the service, putting the best of the two worlds together in the same product, in order to provide the users with best and most accurate service, whether library professionals or end-users.

A short survey of DanBib and bibliotek.dk

The Danish union catalogue is built around two bibliographical databases:

- DanBib – for the library professional
- bibliotek.dk – for the end-user (a subset of DanBib)

DanBib

The DanBib database consists of:

- Bibliographic records and holdings from Danish university libraries, research libraries and special libraries (approx. 170)
- Bibliographic records and holdings from Danish public libraries (approx. 250)

- The Danish national bibliography (books, periodicals, articles, phonograms, AV)
- Periodicals holding from other Nordic and Baltic countries (the “NOSP” catalogue)
- Bibliographic records from the British National Bibliography, Library of Congress and the ISSN Network (from 1981)

Access to DanBib (password required):

- from www: 'Netpunkt': <http://netpunkt.dk>
- from Z39.50 client: 'Zpunkt': z3950.dbc.dk:210/danbib

'Netpunkt' is the web gateway, produced by the Danish Bibliographical Centre (who runs the DanBib service). It gives access to DanBib and customized access to several other databases, including 'BIBSYS' (Norway), 'LIBRIS' (Sweden) and 'WorldCat' (OCLC).

bibliotek.dk

bibliotek.dk is the web interface to the Danish public union catalogue. bibliotek.dk holds a subset of DanBib with free public access for searching and ordering:

- Bibliographic records/holdings from Danish university libraries, research libraries and special libraries (approx. 170)
- Bibliographic records/holdings from Danish public libraries (approx.. 250)
- The Danish national bibliography (books, periodicals, articles, phonograms, AV)

Access to bibliotek.dk:

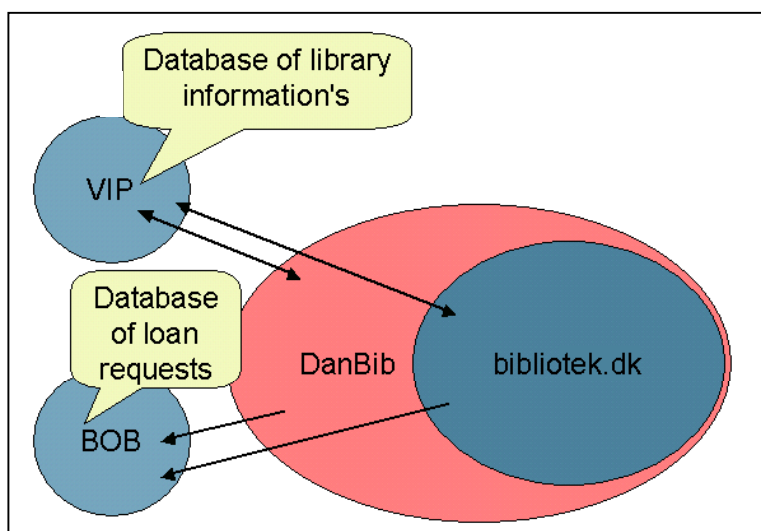
- only through the www: <http://bibliotek.dk>
- English version: <http://library.dk>

Facts about DanBib (opened 1994)	Facts about bibliotek.dk (opened 2000)
24,1 million records, merged/matched in 17,5 million “clusters”	10 million ”clusters” of records (subset of the DanBib database)
1,85 million loan request in 2004	3,9 million loan request since opening
1.1-31.7.2005: 1,1 million loan request	1.1-31.7.2005: 776.390 loan requests

System architecture of DanBib and bibliotek.dk ILL-functions

The ILL- and ordering system is centered around four important components:

- the DanBib system with the Netpunkt gateway
- the bibliotek.dk system
- the VIP-database: database of library directory and information parameters
- the BOB-system: handles loan-requests from bibliotek.dk and ILL-requests from DanBib



The VIP-database

The VIP-database contains all the information about libraries and their services, that is required for e.g. the ILL-functions of the system, for example:

- directory information (name, postal and e-mail addresses etc.)
- information about how the library receives ill-requests (protocol, e-mails, server addresses)
- url's for: home page, local web catalogue, searching on local control number in local web catalogue (used by DanBib and BOB-interface to enable check of local holdings)
- information parameters about the library's service (e.g.: do we accept loan requests from bibliotek.dk of our own material)

The BOB-system and database

The BOB-system consists of server programs that process the loan-requests, including a database with requests from bibliotek.dk and DanBib. It has a web-interface, where the library staff can see:

- loan requests from bibliotek.dk to the library
- loan requests from other libraries (as responder)
- loan requests to other libraries (as requester)

From the web-interface to the BOB-database the library staff can:

- change a bibliotek.dk-loan request into a DanBib ILL-request
- access holdings information about the item in all the local web-catalogues
- send an ILL-answer to the requesting library

ILL in DanBib before Z39.50

From the beginning in 1994 the DanBib system has had ILL-functions. Right from the start we have been able to communicate with local library systems by sending ILL-requests through SMTP (e-mail), with the ILL-message in a machine-readable structure. The format is not based on ISO-ILL, but is a tagged format according to the standard ISO8459-1. Until now most Danish libraries (318 library organizations) upload "receipts" (copies) of their ILL-requests sent to other libraries through DanBib/BOB-system by receiving ISO8459-formatted e-mails.

157 libraries upload machine-readable e-mails with incoming ILL-requests from other libraries, 58 libraries manage their incoming ILL-requests from the web-interface to the BOB-database, 172 libraries receive ordinary, human-readable e-mails with ILL-requests, and 53 libraries communicate ILL-transactions through Z39.50.

ILL-automation using e-mail

Some (but not all) of the libraries, which upload e-mail-requests directly into their local library system, send an ILL-answer to the requesting library. But if they respond with an ILL-answer, this is never formatted in any machine-readable way, and will always have to be processed manually when it returns to the requester. So – all in all – it is merely the processing of the ILL-request – and the upload of the copy of your own ILL-request into the local ILL-module – that at this stage is automated. This is as far as you can get using email ... we do not intend to develop the ISO8459-1-format further.

Information about local holdings in DanBib before Z39.50

The DanBib database contains static holdings information about the bibliographical records:

- which libraries have this item
- do they lend it to others
- periodicals: subscription period, items/issues held

When the present www-portal to DanBib opened in 2002, the static holdings information was supplemented with a link to the record in the libraries' local web-catalogues, thus offering easy access to dynamic holdings and circulation status information from the local web-catalogue. This link is generated in a simple manner:

- in the VIP-database the local library enters the "look-up"-url for their local web-catalogue - that is: the url to a search on the local control number in the local web catalogue
- the web-client constructs the 'look-up-holdings'-url by combining the 'look-up'-url with the library's local control number from the DanBib-record

Z39.50-ILL in Denmark – the danZIG profile

When the evaluators in the "Union catalogue battle" pointed out a direction for DanBib implementing Z39.50-ILL we were not "without means". In Denmark the Z39.50-implementers have worked together under the presidency of the Danish National Library Authority in the 'danZIG'-group (Danish Z39.50-Implementers Group) since 1997, in order to set the profile for implementing the Z39.50-protocol for all library services in Danish libraries, including holdings retrieval and ILL. This work has resulted in the 'danZIG'-profile (3), a profilation of the use of Z39.50 in Danish libraries, including holdings information search and retrieval, ordering and interlibrary loan. The purpose of this profiling of ILL-functions is – in brief - automation. This profile states:

- the holdings format conforms to the ZIG holdings XML-schema (4)
- ILL-messages are sent through Z39.50 *in XML-format* (5),(6)

The danZIG-profile describes the following ISO ILL-services:

- ILL-REQUEST and ILL-ANSWER
- STATUS-QUERY and STATUS-OR-ERROR-REPORT
- CANCEL and CANCEL-REPLY
- RECALL and OVERDUE
- RENEW and RENEW-ANSWER
- (SHIPPED, is to be added to the profile)

It is assumed in the profile, that the Danish union catalogue DanBib should support ILL-REQUEST and ILL-ANSWER, and that all the subsequent services should be performed directly between the library systems Z39.50-clients and –servers. And so it is implemented in the DanBib-/BOB-system.

So far the system is implemented in 53 local library systems, including all the bigger lending libraries among Danish public libraries, plus one of the larger university libraries (the National Library of Education, Denmark).

Z39.50-ILL in DanBib – in practice ...

A user hits the "order"-button in the DanBib web-client. If the holding library receives ILL-requests through Z39.50, the web-client will perform a search for holdings in the local library system (using local control number), and the result is displayed to the user with the order-form:

- for monographs: information about "service-policy" (will we lend you this? and if so: the earliest expected dispatch-date)
- for serials or periodical publications (or other multi-volume items): a list of the volumes/issues, each with information about service-policy. The user chooses the wanted issue, and the DanBib web-client is then able to submit the request with the correct local call-number (the holdings 'targetbibpartid')

The BOB-database is then updated with the ILL-request, and the ILL-request is sent to the local library system through Z39.50. In accordance with the danZIG-profile the responding library returns an ILL-answer to the BOB-system, in which the original request is updated with this answer. If the requesting library is a Z39.50-ILL-library, the ILL-answer is now forwarded through Z39.50 to them. If the requesting library is not a Z39.50-ILL-library, the ILL-answer-message is “converted” to an ordinary e-mail and mailed to the requester.

Using Zpunkt-DanBib for ILL

Most of the Danish local library systems have a Z39.50-client, and one of the major library systems have a Z39.50-client, that can be used for all ILL-services (request – answer - cancel – recall – renew etc.), if both parts are Z39.50-ILL-libraries. For this purpose they can connect directly to the Z39.50-server of another library, if they want to. But they can also search in DanBib through the Z39.50-server (“Zpunkt”), and send Z39.50-ILL-requests to the BOB-system that way. From Zpunkt-DanBib they can retrieve holdings information on “Union Catalogue level”, i.e. static holdings information, including the Z39.50-url of the holding libraries.

The *original intention* with the danZIG-profile was that libraries connecting to DanBib from a Z39.50-client should search and display holdings from DanBib. If the DanBib-holdings displayed a Z39.50-adress of the library itself, all subsequent ILL-transactions (holdings request, ILL-request, ILL-answer etc.) were supposed to be performed directly between the two libraries. And only if the responding library did not display a Z39.50-server-adress of their own, the ILL-requests should be sent to – and handled by - the DanBib ILL-system.

In *reality* - this is not how Danish library system vendors have implemented their Z39.50-client to Zpunkt so far: when connected to Zpunkt-DanBib they send all ILL-requests to the BOB-system. This is not a problem for the BOB-system, which already acts as an intermediary between two library systems in ILL-transactions. Probably other vendors will implement the original model of Z39.50-ILL of the danZIG profile. And Zpunkt-DanBib and the BOB-system will then support both models.

The effect of ILL-automation through Z39.50

For the Z39.50-ILL-libraries in Denmark this means that:

- All incoming ILL-requests (sent through Netpunkt-DanBib or from a Z39.50-client through Zpunkt-DanBib or directly from another Z39.50-client) are received and processed automatically: look-up in the local catalogue, printing “on-shelf”-list or processing a place-on-hold, processing and sending ILL-answers to the requesting libraries
- If ILL-answers are received from other Z39.50-libraries – or when the responding library processes the ILL-answer from the BOB-web-interface – the ILL-answer is also received through Z39.50, and is processed automatically in the local library system
- All the subsequent ILL-transactions (the cancel-, renew-, overdue- and shipped-services) can be processed automatically, if the other part is another Z39.50-system. In these cases not with the DanBib/BOB-system as an intermediary, but through direct Z39.50-communication between the two parts

The Z39.50-libraries therefore obtain all the benefits that automated systems give:

- faster turnaround time
- less paper – less mouse work
- less errors in the handling of ILL
- savings in (expensive and busy) staff time

Thus the DanBib-/BOB-system acts as a 'system-bridge', connecting different library systems on different technological levels. With the benefits of both the "virtual" and the "physical" principles:

- physical: searching the merged union catalogue with holdings from all libraries and easy-to-see display of search result, and using all the facilities and services of the professional union catalogue
- virtual: presenting dynamic holdings information about circulation status and display of list of multi-volume items, enabling correct 'system-no' in ILL-request ('targetbibpartid') when ordering such material

Another use of (Z39.50-)holdings request: automation of 'bibliotek.dk'-loan requests from end users

The Z39.50-ILL-service works with "real" IIL – from one library to another. The loan-requests from the end-users of bibliotek.dk are not ILL, but are – loan requests. The receiving library can in the VIP-database specify whether held material can be ordered through bibliotek.dk. If not - the user is directed to the record in library's own web-catalogue, in which she places her request. Only if the material is not held in the chosen library she can submit a bibliotek.dk-loan-request.

In the BOB-database the requested item is presented with the holdings information from the DanBib union catalogue. The library can (in the VIP-database) customize the order of these holdings. Direct links to the ordered record in all the web-catalogues of the possessing libraries are presented, so that dynamic holdings and circulation status can be checked. There is a "DanBib order"-link, which processes a DanBib-ILL-request with a few mouse-clicks, preserving all information about the end user, making holdings request from Z39.50-libraries etc. - as if you were in Netpunkt-DanBib.

But of course – as library staff does this many times a day (in some libraries: hundreds of times) - the idea emerges: "THIS could be done automatically!" The librarians feel that:

- most of these loan requests are turned into ILL-requests anyway
- they use 3-4 mouse clicks checking holdings in the web catalogues, in order to find the library that can make the earliest deliver – a 'machine' could do this!
- but: some of these loan requests have to be handled manually – not all loan requests can for different reasons be transformed into ILL-requests automatically

The reason for the latter vary:

- the library holds another edition of the material (at the end of 2005 we plan to display and make it possible to order records at a FRBR-like "work"-level, instead of the current "edition"-level)
- the material is brand new, and the library itself might want to buy it

In bibliotek.dk the end-user still does not have to bother with which library possesses the requested material. This principle will not be changed with the automated ILL-procedure. The idea is, that the BOB-system itself – after the end user has submitted the loan request - examines:

- does the chosen library accept automated ILL of this type of material
- do any of the holding libraries accept automated ILL-requests of this type of material
- if yes to both: which of the potential responders has the earliest expected dispatch-date? For this purpose the BOB-system retrieves holdings information from the possible responders

And then finally the BOB-system finds the library with the earliest dispatch date, and what started as a loan request from an end-user in bibliotek.dk automatically ends up as an ILL-request with the

end-users own library as the requester, and the library with the earliest dispatch date as the responding library.

To manage this the requesting library will have to fill in parameters in the VIP-database regarding automated bibliotek.dk-requests. For each type of material:

- yes/no to sending automated ILL
- the material must not be newer than xxx days (for example: 180 days)
- list of possible responders, chosen among the libraries that have accepted to receive automatically submitted ILL-requests for this type of material

The responding libraries will have to fill in parameters for each material type, like:

- yes/no to receiving automated ILL
- the material must not be newer than ... days

The technical demands for the participating libraries are very few:

- requesting and responding libraries have to fill in the VIP-parameters
- responding libraries must be able to deliver XML-holdings as a respond to a (Z39.50)-holdings-present-request

This is what the “Z39.50-ILL”-libraries can do already. But the responding library can receive their DanBib-ILL-requests as they do today (mail, BOB-database, Z39.50) – they do not have to be “Z39.50-ILL”-libraries in order to be a supplier. But they must be able to display XML-holdings. And the only standardized way to do this – for now – is through Z39.50. But of course – the display-format is some XML, and all possible protocols of transporting data this way could be used, e.g. SOAP/XML-webservice.

The idea of automating bibliotek.dk-loan-requests came out of the experiences with the Z39.50-ILL-service. Together with library representatives the Danish Bibliographical Centre has worked during the summer of 2005 with the principles and VIP-database parameters. The next step is to enhance the VIP-database with the automation-parameters, and enable the BOB-server to use them (including finding the fastest supplier). Work on these issues continue the rest of 2005, and we expect to carry out first tests with selected libraries at the end of this year.

User authentication in bibliotek.dk – using ‘NCIP-lookup user service’

The NCIP-standard (‘Niso Circulation Interchange Protocol’ NISO Z39.83-2002) is still a new standard, but has been the tool of the user authentication service in ‘bibliotek.dk’.

The idea is that bibliotek.dk makes a lookup in the local library’s user database, when an end user wants to send a loan request to that library, in order to verify the user in the local library system.

For this purpose the Danish State Library Authority and the danZIG-group made profiles of two ways of authenticate the user in local library system:

1. sending a request through Z39.50 (with SSL-encryption) (7)
2. sending a “real” NCIP-message with valid XML-content for ‘authenticate user’ through https (8)

The first one (the Z39.50-way) was intended as a “quick-and-dirty” implementation, where the NCIP-message-method would be the “right” one, but one that needed further investigation and profilation, as the NCIP-standard was new for most of the participants at this time.

But in the end it turned out that implementing the NCIP-lookup-service was *not* more complicated than using Z39.50 (as an example: Z39.50 through SSL was relatively untested with our toolkit, whereas https is a well-known web-standard).

One of the Danish library system vendors have implemented the Z39.50-authenticate user (running in 30 libraries), while up to now three other vendors have implemented the NCIP-authenticate user-service (running in 17 libraries), and one of the major vendors have it on their release plan for 2005.

Future “virtual” plans and possibilities with DanBib/bibliotek.dk Using SOAP/XML-Web services?

Currently, ‘XML-Web services’ is quite a buzzword. SOAP and XML are general tools in the Internet world, while Z39.50 is a specialized library standard. So now we see a lot of experimentation with this new standard. The “buzz” is: once some content is described in an XML-schema, the communication protocol is of secondary importance:

- it could be Z39.50
- it could be http(s)
- and it could be SOAP/XML

- as in “real” XML-web services. And in the future we shall be able to handle all.

For example:

- an alternative approach to holdings retrieval and ordering (instead of Z39.50 present)
- automated maintenance of local library directories - for example in local ILL-applications - with data from central library directories (such as the VIP database)
- or communicating ILL-XML-messages?

We’ll see ...

Notes:

(1) See for example:

Stubley, Peter. Clumps as catalogues: virtual success or failure, *Ariadne*, no. 22 (December 1999).

Found on: <http://www.ariadne.ac.uk/issue22/distributed/distukcat2.html>

Cliffords A. Lynch: Building the Infrastructure of resource sharing : Union Catalogs, Distributed Search, and Cross-Database Linkage. (CASLIN’99). Found on:

<http://www.caslin.cz:7777/caslin99/a3.htm>

(2) All papers from “The battle of the union catalogue” are available from

<http://www.bs.dk/content.aspx?itemguid={C7E5FDD4-DB6A-4866-9A52-58DDC9BF3363}>

Among the evaluators of the three scenarios were: Mats Herder and Christer Larsson, Sweden, Philip Hider, Singapore, Clifford Lynch, USA , Peter Stubley, UK. All papers of the evaluators (and the scenario description) are in English.

(3) The danZIG profile: <http://www.bs.dk/danZIG> (in English)

(4) ZIG holdings schema: <http://www.loc.gov/Z3950/agency/defns/HoldingsSchema8.xsd>

(5) XML-schema for ILL: <http://www.danbib.dk/docs/z-bestil/illv5.xsd>

(6) ILL-profile 1: <http://www.nlc-bnc.ca/iso/ill/document/standard/z-ill-1a.pdf>

(7) The profile of Z39.50 user authentication support: <http://bibliotek.dk/dok.html> (only in Danish)

(8) The profile of NCIP user authentication support: <http://www.bs.dk/ncip> (in English)