

Case Management for Blaise using Lotus Notes

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Introduction

A significant aspect of field based interviewing is the need to manage the distribution of cases to the interviewer workforce and then to provide those interviewers with a convenient interface where cases can be viewed and interviews initiated.

Although the Blaise suite provides a range of software which can be used to build a suitable Case Management system, there was a preference at the Australian Bureau of Statistics (ABS) and Statistics New Zealand (SNZ) to develop such systems using facilities which are more closely aligned with other systems used in the office. The arrival of the Blaise component pack, and the Blaise API in particular, has made it possible to develop such systems in software other than Blaise while still being able to communicate directly with Blaise data files.

This paper describes the Case Management systems being implemented by ABS and SNZ using Lotus Notes, as the main office based software, and combining this with Blaise to achieve fully integrated facilities to support survey operations in the field and also in the office.

Features of Lotus Notes

Lotus Notes provides Email, workgroup collaboration, document management and Internet services using an intuitive browser-like interface. Notes can deliver significant functionality, security and customisation with applications that range from standard messaging, through collaborative discussion and document libraries, to tailored applications. Lotus Notes is available to all ABS and SNZ staff and is used extensively throughout both agencies.

Notes databases generally contain information about a single area of interest. While the documents within a Notes database can be considered as "records", such documents are more sophisticated than typical database records in that they can contain rich text, pictures, objects and many other types of information.

In recent years, in both the ABS and SNZ, Lotus Notes has emerged as the main application software for many administrative and statistical processes that are carried out on a day-to-day basis. One reason for this is that applications written in Lotus Notes have the same look and feel as the Email and document systems which staff use every day. Notes based applications can therefore be more readily integrated into the desktop environment.

Two significant features of Notes make it an attractive option for Case Management. These are its embedded security options and the ability to efficiently replicate information across the office network, or through the Internet to mobile computers in the field.

The security features of Notes involve a level of encryption which ensures that data is protected from unauthorised external access while on the computer or during transmission. Notes also provides a comprehensive system of access controls which can be used to restrict access to processes, views, forms and data fields.

The replication features of Notes ensure that data which is exchanged via the replication process is successfully updated without risk of corruption. If the same data has been updated at both ends of the replication then both copies are exchanged and identified as a potential conflict. Replication can also occur selectively so that only data which meets selection criteria and security criteria is exchanged. The Notes replication process is efficient in that it only exchanges updated data at the field level within a document, thereby avoiding the unnecessary exchange of unchanged information.

Case Management configuration under Lotus Notes

The main features of the Case Management systems being built in Lotus Notes at ABS and SNZ are:

- a simple graphic user interface for interviewers;
- a Notes database which provides a space in which the cases are presented, distributed and managed;
- Notes documents which serve as containers for case identification, and subsequently for the completed Blaise instrument databases;
- case workflow is managed through the status of the Notes document in the database;
- case information (including partial or fully completed Blaise instruments attached to the Notes document) is exchanged between the office and the field through a system of selective replication;
- various processes are activated via buttons and menu options which execute particular scripts;
- key fields and status information are exchanged between Notes and Blaise through the API;
- security and access control settings ensure that operators can only view and work with cases that are assigned to them;
- use of summary views of the Notes documents to provide up-to-date status information.

These are described in detail below.

Simple Graphic user interface for interviewers

Notes provides facilities to develop graphic user interfaces which contain hotspots, or shortcuts, to Notes databases and other processes. This makes it possible to provide staff with a simple Web-like interface that gives direct access to the main survey processes. Such interfaces are particularly useful for field staff who may not be accustomed to the busy screens often found in today's desktop computing.

Figure 1 shows the graphic interface or "Home page" developed for field staff using the SNZ Case Management system. A similar interface has been built for the ABS system. The page displays only a few choices, which are easy to recognise, and each choice contains a link or shortcut to the relevant process.

Figure 1. Home page for field staff



Notes database

The Case Management system resides within a Notes database which contains forms, views and scripted processes to facilitate all the operations required.

Access to the database is controlled through standard Notes access controls in which users are defined by:

- user type - person, group, server
- access level - reader, author, editor, manager
- role - office user, administrator, interviewer, supervisor

All users require a current Notes user certificate issued by the agency before the Notes system can be activated. All users are required to supply a current password before being able to proceed. The default access to the database is "No access" which prevents unauthorised officers within the organisation from accessing the information. The Notes database can also be stored in an encrypted form so that data is protected from unauthorised access from outside of the Notes system.

Apart from these general access controls, further controls on access are contained within the various components of the database to restrict various functions to relevant users (see later paragraphs).

The database contains a general profile document which is used to record certain system metadata such as the path names for the system software (like Blaise or Winzip) for both office and field environments, as well as the file types which make up a Blaise instrument. The profile document is activated whenever the database is opened and enables the processes to be responsive to changes that may be required from time to time.

A tailored document is used to record the metadata (name, identifier etc) for each survey to be operated through the database. This document also stores the Blaise metadata files required for the interviewing process as attachments. These are detached by the system to a local disk drive for use when required.

All documents are presented through a system of views which show a selection of documents that are sorted and grouped according to relevant characteristics. Figure 2 shows a typical view of cases in the SNZ Case Management system. Similar views have been used in the ABS system. Each row in the view represents a single case and a selection of the characteristics, some in the form of graphics, are presented to assist the user in selecting the one to act upon next.

Figure 2. View of an interviewer's workload

Scheduled	Time	Survey	Reference Number	#	Status	Date Due
Today	13:45	HSS	R95308002	1	Active - Not Started	31/07/2001
Today		HSS	R95308005	1	Active - Incomplete Non-contact: try again	31/07/2001
Today		HSS	R95308006	2	Active - Incomplete	31/07/2001
Today		HSS	R95308008	2	Active - Incomplete	31/07/2001
Today		LISNZ	R75293003	1	Active - Not Started	31/07/2001
Today		LISNZ	R75293004	1	Active - Not Started	31/07/2001
Tomorrow	11:00	HSS	R31997001	1	Active - Not Started	29/09/2001
17/09/2001	18:00	HSS	R31997003	1	Active - Not Started	29/09/2001
		HSS	R31997002	1	Done - Complete	29/09/2001
		HSS	R95308001	1	Received - Complete	31/07/2001
		HSS	R95308007	1	Received - Complete	31/07/2001
		LISNZ	R75293001	1	Received - Complete	31/07/2001
		LISNZ	R75293002	1	Done - Complete	31/07/2001

Notes document as a "container" for case information

The main container for case information is a Notes document which has been designed to be as generic as possible so that it can serve all types of surveys.

The document has been set up to contain the following:

- case identification;
- street address information;
- the name of the instrument to be used for the interview;
- the name of the interviewer to whom the case is assigned;
- status information to indicate where the case is and whether interviewing is complete;
- fields for the details of the survey respondents;

- fields to be used in any office processes such as coding of occupation or industry;
- buttons that can be used to initiate various processes for both office and field work.

Figure 3 shows a typical document containing case information from the SNZ Case Management system. Similar documents are used in the ABS system. The document shows the essential fields necessary for the field staff to use in their work. Other fields, such as the instrument name, are hidden from the interviewer but are accessible to the system. Buttons or hot spots are used to activate particular processes.

Figure 3. Document containing case information

Case Information - Lotus Notes

Close

HSS R95306008 - 8 Ibug Way **Case Active**

Today **20:00** **Period Start 01/07/2001** **Due 31/07/2001**

Household	Complete: Response
Fred	Not Started

Brett Martin's Notes
Respondent does not want to start interview until this evening

Region 7 Supervisor's Comments

Visits

17/07/01 13:00

31/07/01 13:00

Visit time: 00:01:48

Edit time:

The case documents are created from lists of selections provided from the sample frame (held in agency databases) through office processes that are activated from menus or action buttons in the database. The system also allows for a set of generic training cases to be loaded into the database and assigned to interviewers for training purposes.

When an interview is started for the first time from within a case document, the system creates a Blaise data file to record the interview which it places onto a working directory on the hard disk. It does this using the instrument named in the case document along with the metadata files located in the survey definition document (also detached).

Various fields in the document, such as the respondent details and coding fields, are populated with data from the instrument (through the Blaise API) whenever interviewing is carried out or completed. Similarly, aspects of the case which are changed in the Notes document are transferred to the instrument (through the Blaise API) the next time it is activated.

At the end of an interview the Blaise data files that were created or updated are closed and attached (or reattached) to the relevant case document.

Each case document contains all the information about the status and content of one case. This makes it easy to move a single case through all the stages of the survey collection process.

Workflow managed through the status of the Notes document

Once all the case information is placed into Notes documents it is possible to see the survey situation through a series of views which present lists of those documents, selected and sorted according to specific criteria. The key criteria, as mentioned above, are the status fields which reflects the current state of a case.

The status fields in the document will typically go through the following states:

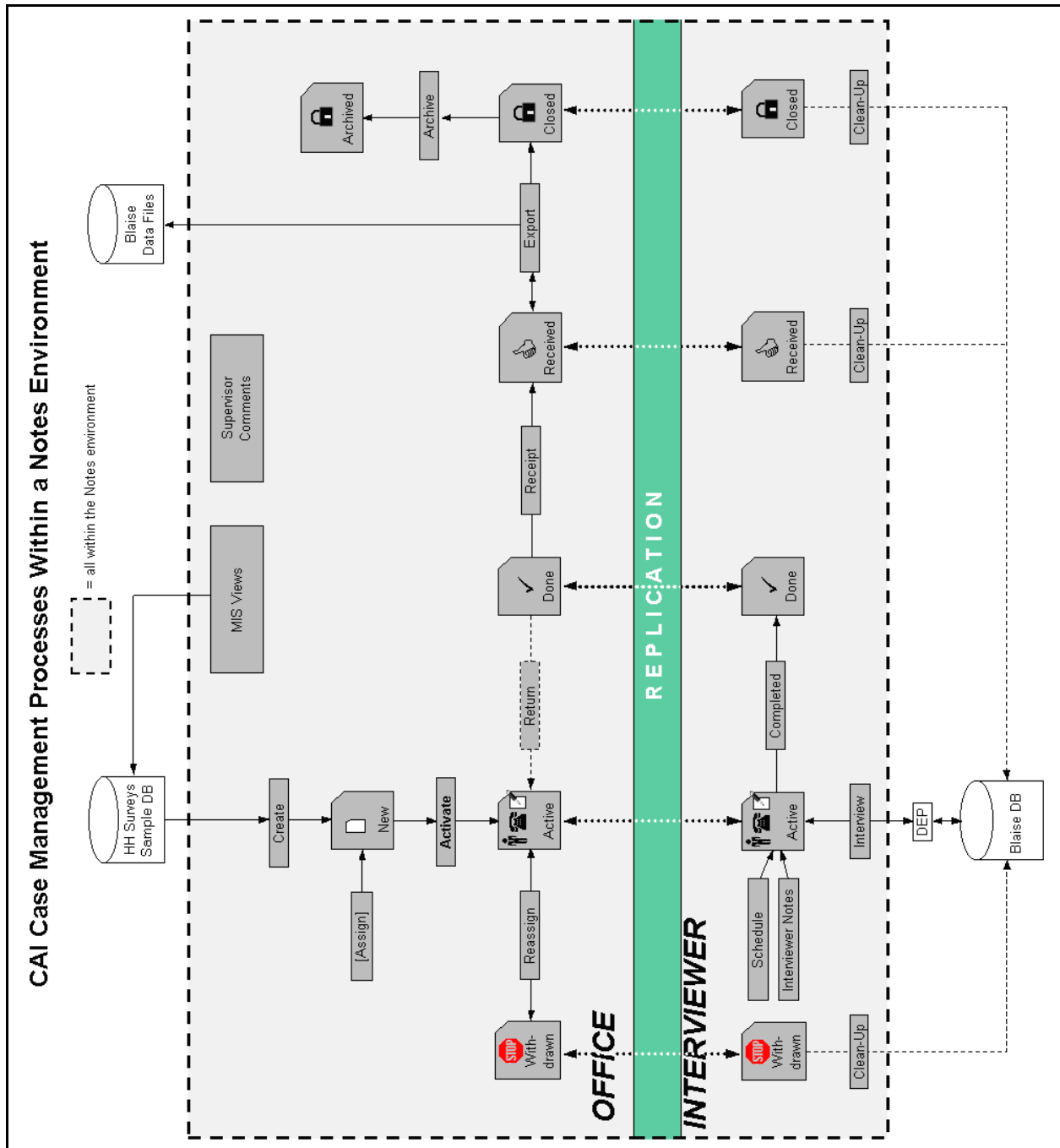
- New – document created for a selected address (ready for assignment);
- Active – available to the interviewer;
- Done – interview completed and ready for return to office;
- Received – returned and accepted by the office;
- Reassign – for assignment to another interviewer;
- Withdrawn – removed because it was reassigned;
- Closed – exported from the system to further processing;
- Archive – removed from the system after export.

Where additional processes are to be carried out, such as office coding, then an additional state can be added to cover that.

Depending on the status of a case, the system enables particular functions to occur or prevents them from occurring. In that way the cases can be assisted to "flow" through the system. For example, when the status of a document is set to "Active" it becomes available on the interviewer's computer and interviewing can be carried out. Once the status of a document is set to "Done" in the field then interviewing is no longer possible.

Figure 4 shows how document status can be used to define the workflow from creation through all stages of collection to archival. At various stages the document, containing the case, is replicated to or from the interviewer in the field.

Figure 4. Case Management workflow



Case information exchanged through a system of selective replication

As mentioned earlier, one of the main features of Notes is the ability to replicate or exchange data between copies of a database. In the case of the management of a survey in the field, every interviewer is equipped with a replica of the main Notes database but the replication settings and document security ensure that interviewers only receive the cases which are intended for them and no others.

Selective replication is important for reducing the volume of data which is exchanged and reducing the risk of an interviewer accessing the wrong records.

Selective replication works through applying a selection condition to the documents which are exchanged between the office copy of the database and field copy. The selection conditions and document security settings identify the type of documents to exchange and/or whether the documents have been assigned to the interviewer (identified by their logon user name) who is carrying out the transmission.

Processes activated through buttons and menus

The Notes database environment is one in which the user can be provided with a simple and user-friendly interface. Most processes that need to be carried out are made easy to do through a system of buttons and menus which are located in relevant positions throughout the views and forms.

The environment for field staff is made even easier by setting up the system to "hide" views and processes which are not relevant to them. Some standard features of the Notes environment can also be turned off for the field staff who do not need to use them. Other simplifications are possible through "automation" whereby processes are triggered whenever certain circumstances arise. For example, a new survey instrument is detached from the survey metadata form the first time it is needed.

The environment for office staff, while more complex than for field staff, is expected to be relatively easy to use by them because it conforms in design and features to the standards and conventions in place for the many other Notes based applications that exist at ABS and SNZ.

The buttons and menus provided in the database activate various agents which have been written in Lotus script and are stored within the database.

Execution of Blaise processes under Notes

Where processes, such as data capture or export of data, need to make use of Blaise software components these are executed from within the Lotus script. The relevant call to the software is prepared within the script and then executed directly. Control of the process is handed to the relevant Blaise executable through the use of the Windows Scripting Host Shell method. When the particular process is completed the control returns to Notes.

The availability of a Dynamic Link Library (DLL) in Blaise 4.5 makes it possible to call the Blaise Data Entry Program or Manipula in a direct way.

Key fields and status information are exchanged between Notes and Blaise through the API

Where needed, the scripted agents access the Blaise data files for any case through the Blaise API.

The Blaise data files are accessed from a working directory on the hard disk where they are placed when the case document is opened. When access to the Blaise data is completed the data files are then reattached to the case document in the Notes database. The metadata definition files are not attached to case documents since that would result in many copies of the same metadata files being stored unnecessarily.

In order to facilitate the exchange of information between Notes and Blaise a standard list of fields to be exchanged was developed in Blaise and is incorporated into every instrument. This makes it easier to use the same agents for many surveys and reduces the maintenance requirements.

Access control settings to ensure operators can only access their own work

As mentioned earlier, the general access and security of the Notes database is managed through the Notes user ID and access settings in the Notes database. Access controls go further than that, however, to ensure that operators only access the cases and functions to which they are authorised.

Access to elements of the Notes database (views, documents or functions) is mostly managed through the role setting. Office staff who need access to the full range of functions are added to the access control list by name and then placed into the relevant role. This then opens up relevant parts of the database for them to use.

Particular functions are enabled or hidden for particular roles in the database through the use of "Hide when" statements which can be attached to any element of the database (i.e. to views, forms, fields, buttons, or even data fields within any document).

Cases are assigned to interviewers by their login name. Once that assignment has been made then view settings and/or document security settings are used to enable or restrict the views of available cases.

When combined with the selective replication and security settings mentioned above, the Notes database environment provides a shared workspace in which each user gets to see and act only on those documents which are of direct relevance to them.

Summary views of the Notes documents provide up-to-date status information

With all the case documents being stored in the same Notes database it provides a convenient place to obtain up-to-date information on the progress of the survey.

Status reporting is achieved by a series of summary views through which counts and summary totals are produced for the main status fields. Totals can be presented by various items of interest such as by interviewer or region. Whenever the case documents are updated the summary views will immediately reflect the latest position.

Discussion issues

The implementation of any Case Management system has to handle specific problems. The discussion which follows looks at the way that these issues have been addressed in the context of Notes

Concurrency control of cases

In any computer based Case Management system there will be many times when there are two copies of a case. The most common situation occurs while a case is in the field and the original copy is still in the office system. If updates are made to both copies of the case, problems can arise when the two copies are brought back together. Firstly, the system needs to detect that changes have been made to both copies and, secondly, a decision needs to be made as to which one should be kept.

In relation to the first problem, Notes detects whether changes have occurred in two (or more) copies of the same document since the last time they were replicated. This is a standard feature of Notes and when potentially conflicting changes to a data field are found a duplicate document is produced and flagged by the system as a "replication conflict". Unfortunately, resolution of the conflict still requires someone to make a decision as to which copy should be kept.

The Case Management system described in this paper has been designed in such a way that conflicts of this kind are very unlikely to occur. By using the document status outlined earlier, along with Notes access controls on documents and functions, it is possible to prevent changes made in the office copy of a case document conflicting with changes made to the same case in the field.

Case reassignment

One common situation, which can lead to a conflict of cases, if not managed properly, is the reassignment (or transfer) of cases between interviewers. If cases are simply reassigned and sent to another interviewer, then a “replication conflict” is very likely to happen, particularly if the first interviewer has already commenced an interview.

The solution developed for this situation in Notes is for case documents that have been marked for reassignment to be duplicated by the system and then the new copy is assigned to another interviewer. The old copy of the case remains but has its status changed to “withdrawn” which will eventually lead to its removal from the system.

Creation of new cases

From time to time it may be necessary for new cases to be created in the field, particularly to handle variations in the sample since address lists were prepared.

The system includes agents which enable an interviewer to initiate a new case. Details of any new cases are then transferred to the office through the replication process

More than one interviewer using the same computer

Systems need to accommodate the situation where more than one interviewer can use the same computer. Certainly this is the case in the ABS where computer assisted interviewing is still being introduced and not every interviewer is equipped with a computer. While it is possible to configure a computer for two or more users, the problem is to ensure that the Case Management system presents only the relevant cases to each interviewer while using the same facilities.

As mentioned earlier, the Notes system for Case Management employs settings within the database that ensure cases are only visible where the assigned interviewer name matches the interviewer’s logon name. Thus two (or more) interviewers can safely work within the same database on the same computer but access only the cases which are assigned to them. The only problem that remains is that each interviewer will need to replicate the database with the office in person because the selective replication settings will only exchange cases that relate to whoever is logged on at the time.

More than one survey to be supported at the same time

The Case Management system described above has been implemented to be as generic as possible. The parts that change from survey to survey (eg. the instrument) are managed through the survey metadata document. Most views of the cases in the database also include the survey name as a key attribute. It is therefore possible to support the operations of more than one survey at a time.

Support for multiple surveys extends to the interviewers, who may be called upon to work on different surveys in the same time period. When that happens, the views in the database will show the cases grouped by survey name if required.

Avoiding data loss and corruption

Systems that rely on field computers are liable to place the data at risk of loss or corruption due to events such as loss of battery power or interviewers not following procedures. It is necessary to build remote systems in such a way that interruptions to the interview do not place the data at risk.

The Notes based Case Management system described above uses a local directory to place the Blaise data files that are used for interviewing. At the end of the interview the data files are attached or reattached to the case document. In order to avoid potential corruption or loss of the data the following measures were implemented in the actions associated with interviewing:

- data files are archived before and after the interview is carried out – this ensures that recovery of at least some of the data is possible;
- the working directory used to store the data files during the interview is examined for any residual files from earlier interviews before a new interview is started. If files are found then special recovery agents are activated to locate the case relating to the earlier interview and reattach the data files;
- while the interview is in progress other functions of the computer are suspended until the interview is terminated in some way – it is not possible to make changes to any other cases while an interview is in progress.

Transmission and security issues

Good case management goes beyond the management of cases in the office and the field to include the secure transmission of case material between the office and field work force.

The Notes environment uses standard Internet TCP/IP transmission protocols. Industry standard encryption is employed both within the Notes database and during transmission to ensure that data exchanges are secure. Furthermore, interviewers can initiate the transmission process through the simple press of a few buttons.

While the level of security provided in this way is sufficient for safe transmission via Notes and the Internet, an additional encryption and authentication layer can be employed through application of Virtual Private Network (VPN) technology if so desired.

All data stored on the hard disk in field computers is also held in an encrypted format available under Windows 2000.

Software upgrades

All computer based systems need to be designed for the possibility that software will be upgraded from time to time. The software component which is regularly updated, of course, is the survey instrument but major software upgrades also need to be handled.

The Notes Case Management system described above has been built to handle a range of different survey instruments, although they are required to have a common core of management fields. New instruments are defined and attached to a survey metadata document, as and when required, and replication takes care of their distribution to the field.

Support for major software releases to field computers at ABS and SNZ is also managed through a Notes database application. Given the potential complexity of this process, however, the application is kept separate from the Case Management system, although there are important links. Briefly, the software release application maintains a profile document for each field computer and updates are supplied through “container” documents similar to those used for Case Management. When an upgrade is required the system detaches the software and places install agents in the start-up folder to be activated when the computer is next switched on.

Email, news and other applications of Lotus Notes

The use of computers that are configured to run Lotus Notes opens up many other possibilities for information exchange by field staff.

While direct use of Email through Notes is easy, it can lead to problems with foreign material entering systems. As a result, there is a preference not to provide full access to Email services to field staff. Instead, Lotus Notes can provide the ability to exchange information through a “discussion” database where office and field staff can create and exchange documents in a shared space for all to see. This database is also kept separate from the Case Management application.

Notes applications have been developed at ABS and SNZ for other administrative processes associated with field staff. These include Contract management, Reference information, Time and travel recording and Pay advice.

Conclusions

Case management is a vital part of survey operations and it is important to have a system that can support the wide range of functions that case management requires.

This paper highlights the features of Lotus Notes which make it an excellent choice of software to build such a system. At the same time, there is recognition that the existence of Blaise API components has made it possible to build a flexible system which integrates the good features of Notes with the strengths of Blaise in conducting interviews and storing the data.

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