ExLibris
Aleph

How to Integrate Aleph with the HK System

Version 20 and later

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TRADEMARKS

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1 Introduction

The HK system is an Automated Retrieval System-ARS (also known as Warehouse Management System-WMS) that is used to handle storage and accessibility to library materials that are warehoused at remote storage facilities.

Materials stored remotely are retrieved by a machine, also called "robot arm", for circulation to library patrons.

Aleph supports communication using TCP/IP with the HK robot arm so that ongoing updates are transferred between the systems. This includes the following features:

- Processing of hold requests made in Aleph where the requested physical items are stored in a compact storage unit controlled by ARS and operated by a robotic arm.

- Addition of items to the ARS database when items are added or updated in Aleph.

- Notification from Aleph to the ARS system when items are deleted or no longer defined as being in compact storage.

2 Aleph Integration with the HK System

The following Aleph scenarios trigger the sending of a message to the ARS:

- An item is added to the collection defined as the "ARS collection". Message type ADDI is sent to ARS.

- The item is removed from the ARS collection. Message type DELI is sent to ARS.

- The item is requested from the ARS collection. Message type REQI is sent to ARS.

The transferred messages are structured as required by the HK system so that ARS is updated with relevant information and required actions are performed to the ARS.

The following two tools are used in implementing these actions:

- Aleph ue_23 daemon is in charge of sending messages from Aleph to HK.

- Aleph ARS server is in charge of receiving and processing messages from HK to Aleph.

2.1 Sending Messages from Aleph to the ARS:

The Ue_23 daemon is in charge of transferring the communications to the HK software.

The above workflows create triggers that are processed by the ue_23 Aleph daemon.

The transferred messages are structured as required by the HK system so that ARS are updated with relevant information and required actions are performed to the ARS: add/remove/request item.

The following are the messages that can be sent from Aleph to the HK system. Detailed workflows and Aleph functionality are explained below.

Message HK code (description)	Aleph code	Functionality
IA (Inventory Added)	ADDI	Message is sent by Aleph to update HK that item is added to the ARS
ID (Inventory Delete)	DELI	Message is sent by Aleph to update HK that item is removed from ARS
PR (Pick Request)	REQI	Message is sent by Aleph to update HK that ARS item is requested
HM (Heart Beat)		Message is sent by Aleph to verify that ARS server side is active
TR (Transaction Response)		Message is sent by Aleph to HK as a response to a message received from HK (handshaking mechanism).

Note that Expected Store (ES) and Status Check (SC) messages will not be sent by Aleph to HK system since there are no equivalent workflows in Aleph that support producing those messages.

2.2 Receiving messages from the ARS to Aleph:

The Aleph ARS server receives communications from the HK software.

The ARS server is started in the ADM library (e.g.: USM50) by using the Aleph server UTIL W/3/7/ l menu. It is stopped by the UTIL W/2/7/6 menu. The ARS server log can be monitored using UTIL W/1/8 menu.

Following are the messages that can be sent from HK system to Aleph. Detailed workflows and Aleph functionality are specified in below chapters.

Message HK code (description)	Functionality
IC (Inventory Confirm)	Message is sent by HK to Aleph in response to IA (Inventory Added) when item is added to ARS

DC (Delete Confirm)	A message is sent by HK to Aleph in response to ID (Inventory Deleted) when item is removed from ARS
RF (Request Filled)	A message is sent by HK to Aleph in response to PR (Pick Request) when item is picked to fill Aleph hold request.
IR (Item Returned)	A message is sent by HK to Aleph when item is returned from Alep to ARS.
HM (Heart Beat)	A message is sent by HK to Aleph to verify that Aleph ARS server side is active.
TR (Transaction Response)	A message is sent by HK as a response to a message received from Aleph (handshaking mechanism). It responds to all types of messages, including HK messages which are not applicable for Aleph workflow.

Note that Status Message (SM), which is a response to Status Check (SC), is not expected to be sent from HK to Aleph since Status Check is not supported.
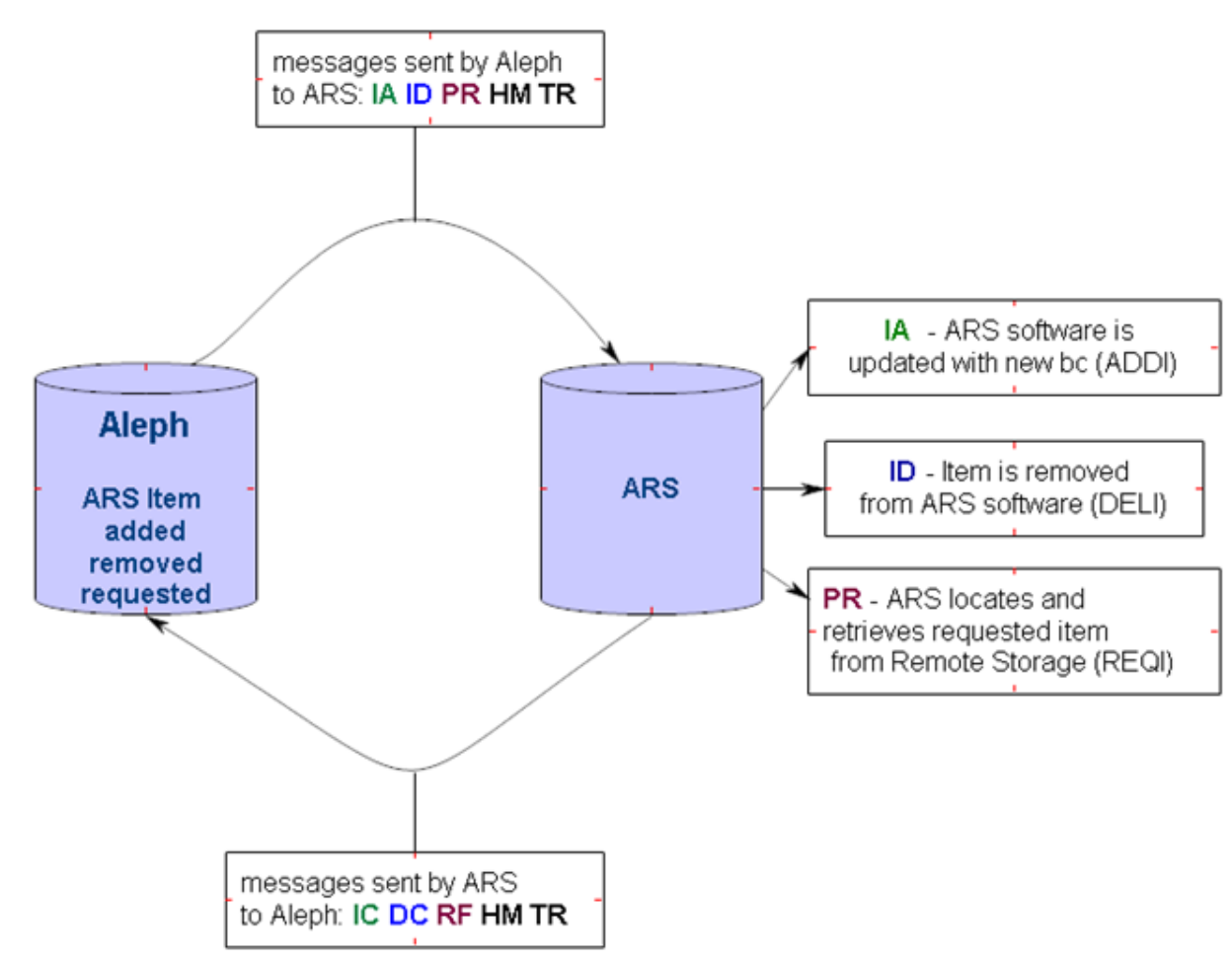
The following chapters describe how the Aleph workflow and configurations interoperate with the ARS software.

3   Communication between Aleph and the HK- ARS

Below is a brief overview of the communication cycle between Aleph and the ARS.

1. A daemon on the Aleph Server,ue_23, checks for new Aleph Z116 messages to send to the ARS when a request is made for an item stored remotely, or when a item need to be added or removed from the ARS.

2. When ue_23 finds new Z116 messages on the Aleph Server, it connects and sends them to the ARS database via a standard TCP/IP connection.

3. The ARS receives and process the messages sent by the Aleph daemon. The ARS application is capable of sending acknowledge messages to Aleph.

4. Aleph ARS server receives and process the messages sent by the HK system.

3.1 UE_23 - Configuration and Set-Up

Ue_23 in an Aleph daemon is in charge of transferring Z116 messaged to ARS.
The daemon's configuration is set in ./alephe/tab/tab_hk_system.conf

3.1.1 Activating the ue_23 Daemon

UE_23 is activated in usr_library (e.g.: USR00) by using the Aleph server UTIL E / 23 util menu.
It is stopped by the UTIL E /24 util menu.

Ue_23 can be automatically restarted when the Aleph server is booted up and the system startup procedures are initiated. To implement this, define the environment in which the daemon is automatically run in ./alephe/aleph_start as in the following example:

```
setenv   MESSAGE_STARTUP_LIBS  "$usr_library"
```

In addition, add the following lines to ./alephe/aleph_startup:

```
#*******************************************
#     UE_23
#*******************************************

echo "starting hk system message daemon..."

    if  ($?MESSAGE_STARTUP_LIBS) then
         set message_startup_libs = ($MESSAGE_STARTUP_LIBS)
    else
         set message_startup_libs = ""
    endif

    foreach lib ($message_startup_libs)
         start_proc00 $lib
         echo "  - $active_library "
         source $aleph_proc/util_e_23
    end

    echo " "
```

Ue_23 can be automatically shut-down when the Aleph is shut. For this purpose add the following lines to ./alephe/aleph_shutdown:

```
touch $data_scratch/util_e_23_stop
```

3.1.2 Initial Setting of Z116 (HK Messages)

To initially set Z116 (HK Messages):

1) Add Z116 to the file list of the user_library.

For example, add the following lines to ./usr00/file_list:

```
!1   2                    3           4           5               6
!    !                    !           !           !               !
TAB z116                 100K        100K        ts0
IND z116_id              100K        100K        ts1
```

2) In usr_library (e.g. USR00), perform UTIL A / 17 / 1 to create Z116 and its indexes.

3.1.3 Ue_23 Daemon Configuration – tab_hk_system.conf

The ue_23 daemon configuration is set by ./alephe/tab/tab_hk_system.conf.
This table defines different parameters for the HK System interface and ue_23.

The following is an example of tab_hk_system.conf:

```
         1
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

[Main]
    server = 10.1.239.32:8500
    frequency = 60

    ars_server = 10.1.239.32:8500

[ARS]
    sublib = LAW,MUS,EDUC

[Char-Conv]
    output = UTF_TO_8859_1
    input = 8859_1_TO_UTF

[Debug]
    level = 2
    test = Y
    update = N

[Letter]
   format=00
   printid=2320
```

The following parameters can be defined in this table:

- [Main] section:
    - o server   - Enter the ip address and port number of the HK System.
                        Format: ip:port. This is used by ue_23 for sending messages to HK system.

- o frequency   - Defines the time (in seconds) the ue_23 daemon waits before starting a new cycle. Default: 60
  - o ars_server   - Enter ip address and port number of the HK system. Format: ip:port . This is used for handling messages received from the HK system.

- [ARS] section:
  - o sublib   - Defines up to 20 sublibraries, separated by ",", designating an item to be stored in the
  - o ARS. This is the list of sublibrary codes used for ARS items (items housed in the remote ARS storage).
- [Char-Conv] section:

  - o input   - Character conversion, as defined in the tab_character_conversion_line table, to be used to translate data from the HK System to Aleph.Currently not in use.
  - o output   - Character conversion, as defined in the tab_character_conversion_line table, to be used to translate data from Aleph to the HK System.

- [Debug] section:
  - o level   - 0/1/2 flag. If set to 1, a variety of error, warning, and informational messages are logged to the ue_23 log file. If set to 2, all messages sent to the HK System are reported in the ue_23 log file. Default: 0

  - o test   - Y/N flag. If set to Y, the ue_23 does not try to sent the messages to the HK server. Default: N

  - o update   - Y/N flag. If set to N, the Z116 messages remain in the Aleph database. Default: Y
- [Letter] section:
  - o Format   - The format number for delete notice letter that is produced for the patron when the requested item cannot be provided.
  - o printid   - The printer ID for printing hold request delete notice letter for the patron.

3.2   Aleph ARS Server

The Aleph ARS server is in charge of receiving messages from HK system, displaying message details in server log file and activating Aleph functionality (if needed) .

3.2.1   Aleph ARS Server Log File Display

The Aleph ARS server receives and processes all messages sent from HK to Aleph.

Messages which report a failure (status code is not 000) are displayed in the Aleph ARS server log as in the following example:

A message sent from HK system to Aleph in order to notify Aleph that there was a problem with a message that was received earlier.

The item barcode in the previous message was"12345678901234".
The status message was sent at 2:30:30 PM on May 24, 2009 with a transaction number of "00017" and the reject reason is that the item was not found in the ARS and a pickup location of 'CRCDSK'.

The receive message string is:
'RF000172009240514303012345678901234003CRCDSK'

Aleph ARS server log file displays the message string and textual description of the error code as in the following example:

```
RF000172009240514303012345678901234003CRCDSK
2010-01-18 06:20:25 [err] Item is not in MCS database.
```

The textual description of the error text is part of the Aleph error mechanism:
./aleph/error_<lng>/ars_server

'Status Code' textual description

Code	Textual Description	Comment
000	Request completion (no errors)	Messages with status code 000 are not displayed in the Aleph ARS server log
001	Item has been committed to a request	**For TR only**: 001 will be translated to: – Wrong message type
002	Item has been checked out	
003	Item is not in MCS database	
004	Item is missing	
005	Item has not been returned	
006	Item has bad item number	
007	Item is available	
008	Item is already in MCS database	
009	Item is stored in ARS rack	
010	Item has been deleted from the	

Code	Textual Description	Comment
	ARS database	
011	Item has bad item status	
012	Item is in Locked location	
013	Item is stored in bad location	
014	Item has duplicate pick request	
015	Item is delete pending	
016	Item request or return transaction was deleted by user	
999	Item status unknown	

3.3   Setting ARS Items in Aleph Configuration Tables

The ARS items should be assigned in Aleph with dedicated Aleph sublibrary codes (Z30-SUB-LIBRARY), as defined in "sublib" variable of tab_hk_system.conf.

ARS functionalities are applied only for items whose sublibrary's code match the codes listed in tab_hk_system.conf.

Having a dedicated sublibrary code for ARS items allows defining special policy for handling ARS items and processing ARS hold requests using Aleph workflows.

For example:

- tab_sub_library.lng – library policy can be defined for ARS items by setting the group ID for the ARS sublibrary code. Columns 6 thru 8 of tab_sub_library.lng can be set with group IDs to be applied on tab15.lng (item status), tab16 (Due dates, fines, and limits), and tab17 (library's open hours).

- tab15.lng – sets the ARS item status using the group ID defined in tab_sub_library.lng

- tab16 – defines the ARS item policy for loans, hold request, fines, etc, using group ID defined in tab_sub_library.lng

- tab17 – sets the ARS activity hours using group ID defined in tab_sub_library.lng

- tab37 – contains hold request pick up list locations for item retrieved using the HK systems

- tab27 – contains request "action" configuration for ARS items holds

- tab14 – re-shelving time for ARS items

- tab39 – ue_06 hold requests daemon configuration

- tab_attr_sub_library – setting "In transit" when ARS items are returned by patron.

3.4   Adding an Item to the ARS

Workflow for integration between Aleph and HK – add/update item
Note that a TR (Transaction Response) is always sent after receiving a message. Even though it is not detailed in workflow below, it is part of the machine communication workflow.

1. An item is added or updated in Aleph. The "add/update" action is done by staff user or any other Aleph flow/mechanism that add/update item records.
2. The item's sublibrary indicates that item is assigned to remote ARS storage.
3. An IA message (Inventory Add, Aleph: ADDI) is sent from Aleph to the HK software that controls the ARS facility.
4. The HK system attempts to add the item to its database or updates an existing item.
5. The HK system sends a response to Aleph: IC (Inventory Confirm).
6. The Aleph ARS server receives the response message. In case of a failure (IC message status code is not 000), the Aleph server log shows the response details in the server log (as in above sample). Staff user is expected to review the log to detect the failed messages

The above workflow works for the following item add/update scenarios:
- A new item is added to Aleph and its sublibrary code indicates it is an ARS item.
- An existing item is changed from XXX sublibrary code to ARS sublibrary code.
- An item which is already stored in ARS is updated with a new barcode.

The add message contains:
- A two-character request code "IA"
- A five-digit sequence number
- The date and time of the request
- The item barcode to be added to the ARS (14-character)
- The call number of the item (50-character maximum)
- The name of the author (35-character maximum)
- The title (35-character maximum)

3.5   Removing a Barcode from the ARS

Workflow for integration between Aleph and HK – remove barcode
Note that a TR (Transaction Response) is always sent after receiving a message. Even though it is not detailed in the workflow below, it is part of the machine communication workflow.

1. An item barcode is deleted from Aleph <u>or</u> an existing item is removed from the ARS collection. The item delete/update action is done by a staff user or any other Aleph flow/mechanism that delete item records.
2. The deleted/updated item's sublibrary indicates that item is assigned to remote ARS storage.
3. An ID message (Inventory Delete, Aleph: DELI), is sent from Aleph to the HK software that controls the ARS facility.
4. The HK system removes the item from its database.
5. The HK system sends response to Aleph: DC (Delete Confirm).
6. The Aleph ARS server receives the response message. In case of a failure (DC message status code is not 000), the Aleph server log shows the response details in the server log. Staff user is expected to review the log to detect the failed messages.

The above workflow works for the following item barcode deletion scenarios:
- An existing ARS item is deleted.
- An existing item sublibrary code is changed from ARS sublibrary code to XXX (item is no longer defined as in the ARS).

The delete message contains:
- A two-character request code "ID"
- A five-digit sequence number
- The date and tTime of the request
- The item barcode to be added to the ARS (14-character)

3.6 Requesting an Item from ARS

Workflow for integration between Aleph and HK – Requesting ARS item
Note that a TR (Transaction Response) is always sent after receiving a message. Even though it is not detailed in below workflow, it is part of the machine communication workflow.

1. An item is requested by staff user via GUI or by patron via OPAC.
2. The item's sublibrary indicates that item is stored in the ARS.
3. The ARS item's hold request is created as in the usual Aleph flow with no special parameters/indicators.
4. The hold request is processed using one of Aleph usual routines:
   - ue_06 - hold request daemon (configured using tab39)
   - cir-12 - batch service for processing hold requests
5. When the Hold Request slip is printed (hold-request-slip.xsl) for ARS items, a PR message (Pick Request, Aleph: REQI) is sent by Aleph to the HK software that controls the ARS facility. ue_06 and cir-12 support handling ARS hold requests. Note that a message to the HK system is triggered only when the "Hold Request Slip" is produced. If ue_06 or cir-12 produces a 'Wait slip' or any other routine that indicates that the item cannot be currently picked-up, a message is not sent to HK system.

6. The HK system receives the PR message, identifies the requested item by barcode, and activates the robotic arm to retrieve the item from a compact storage bin. Response sent to Aleph: RF (Request Filled).
7. The Aleph ARS server receives the response. In case of a failure (RF message status code is not 000) the Aleph server log shows the response details.
8. If the RF status code message is not 000 (that is, the status code shows that the request cannot be filled by the HK system), the hold request is deleted and a delete notice (hold-delete-letter-s-<nn>) is produced for the patron. The following deletion reason is printed in the deletion notice to the patron, "Request cannot be filled by the ARS robotic arm system". (This text is hard-coded and implanted with <user-note> tag of hold-delete-letter-s-<nn>). Depending on the Aleph configuration, a hold request history record is created (tab100-CREATE-Z37H=Y).
9. If a request is filled by the HK system (RF status code message is 000-no errors and item is provided), a library staff user takes the item, puts the printed hold request slip (with item and patron information) inside the item, and places the item in the library's reserve desk where the patron picks it up.
10. The patron appears at the Reserve Desk. The item is checked out (loaned) to him via Aleph (most items are used in the library only).
11. The item is checked in (returned) by the patron via Aleph. The item is marked as "In transit" (as defined in tab_attr_sub_library) and loaned to ARS sublibrary (item's sublibrary).
12. The item is moved back to the ARS facility and returned to the HK system. The HK system sends the following response to Aleph: IR (Item Returned).
13. The Aleph ARS server receives the response. In case of a failure (the IR message status code is not 000) the Aleph server log shows the response details. The item is checked in (returned) again via Aleph (this time the item is returned by its sublibrary.) The item is no longer loaned.
14. The HK system locates a storage bin for the item. (It retrieves a bin or uses one already present at the staff station). Staff places the item in the bin. The robotic arm picks the bin up and places it in the compact storage area. (For Aleph it does not matter in which bin the item is placed.)

The request message contains:
- A two-character request code, "PR"
- A five-digit sequence number
- The date and time of the request
- The item barcode to be added to the ARS (14-character)
- The requested pickup location for the item (6 character maximum)
- A one character priority code (only "N" is supported)
- The barcode of the patron requesting the item (20-character maximum)
- The name of the patron requesting the item (40-character maximum)
- The call number of the requested item (50-character maximum)
- The title (35-character maximum)
- The name of the author (35-character maximum)