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HL7 Socket Tech. Document

July 31, 2014

Revision History

1.1 General Edits

1.2 Added A08 trigger event and replaced "Visits Units" to "Qty" in SCH Process records generic mapping.

1.3 Updated to include medication, immunization and service import features to the interface

The purpose of this document is to explain how CAREWare processes information conveyed as HL7 and sent through the CAREWare Socket Interface. Like all CAREWare import features, the Socket Interface translates source values so that they are compatible with destination fields. The sources in this case are values from elements in the HL7 message, and these translations are called mappings in CAREWare.

The HL7 socket uses a combination of predefined HL7 fields to determine which fields to look at for certain things to match on as well, and it uses a new generic mapping architecture for these translations. The predefined fields are primarily used for domain mapping, client mapping, and lab mappings. This document focuses on the new generic mapping architecture. The HL7 Socket currently has been tested with HL7 version 2.3.

HL7 Messages Types, Trigger Events, and Indexes

The HL7 socket module processes six different types of HL7 messages: ADT, BAR, ORU, VXU, VXR, RAS and SIU. These messages contain data for hospital admissions and demographics (ADT), diagnoses (BAR, ADT, and SIU), tests (ORU), and appointments (SIU). The HL7 element "Message Type" is found in the MSH segment at position 9. The trigger event is a subfield of this element which is found at the first subfield 9.1. Although each message type has multiple trigger events, CAREWare will only process a specified few.

For ORU messages, the trigger event that CAREWare looks for is R01. If no trigger event is given for ORU messages, CAREWare assumes an R01 event. CAREWare processes ADT message events A01 (admit notification), A03 (discharge), A11 (cancel), A08 (Update patient information), A34 (merge patient), and A35 (merge patient). It will process SIU message events S12 (new appointment), S13 (rescheduling), and S14 (modification). CAREWare will process any BAR message event but will only import diagnoses (if there are any). CAREWare imports medications from O01 (Order message - RAS) and imports immunizations from V03 and V04 of either VXR (Vaccination record response) or VXU (Unsolicited vaccination record update).

Indexes are CAREWare's way to break down the import process into distinct steps. All messages will initially be processed by the *Make Stubs* index. This index parses the raw HL7 message and takes only the valid messages based on the message type and trigger event. It breaks down messages with multiple MSH segments and multiple PID segments into a single MSH/PID message, and then it creates document stubs, which are representations of the HL7 message that hold the status and fields necessary for processing. This simplification makes the CouchDB processing more efficient.

The *Map Provider* Index creates and uses the provider mappings that associate the HL7 message with a domain in CAREWare. The value CAREWare typically uses to match the message to a domain is found in the Receiving Facility and Sending application element in the MSH segment. If no value is present for the Receiving Facility element, the user can set up an alternate value by specifying the segment and position in the field mapping section of the *HL7_Make_Document_Stubs* index. It takes the alternate value and stores it in the Receiving Facility element when processing begins. When CAREWare processes this index, it initially creates a mapping record if none exists for this Receiving Facility and Sending Application pair; the message and its stubs are marked for deletion since no activation code or domain specification has been set up for it. Once a domain mapping is set up and an activation code is entered for this Receiving Facility/Sending Application pair, CAREWare will update the import status to Map Client.

The *Map Client* index is used to match the HL7 message to a CAREWare patient. The interface uses the Patient ID (External ID) found in the PID segment to identify patients. The provider mapping specification done in the Map Provider part of the process allows the user to specify which CAREWare field to use for matching. If the message does not contain a value for the PID element, the user can specify an alternate value using the field mapping in the *HL7_Make_Document_Stubs* index.

In addition to matching the patient based on the value, CAREWare uses a secondary check called the demographic threshold, which considers additional criteria even when the ID matches as described above. This additional check compares last name, first name, and date of birth, and the threshold set in the provider mappings will determine how closely those demographic elements need to match in order for the record to be considered a match. When that threshold is not met, the message and all related stubs are marked for deletion. However, CAREWare also has a feature to automatically add new clients based on user configurable setting.

In cases where the patient information does not match an existing CAREWare client record, the interface can still import results into an observation domain, which stores data for Ryan White-suspected patients, depending on whether test, diagnosis, and generic condition results meet certain criteria. For test conditions, the interface checks for a result for a particular test; for diagnosis conditions, the interface checks for whether or not the patient had a particular diagnosis. For generic conditions, the user can set the interface to compare any segment element to a user-defined value.

The *Process Records* Index is used to import specific data into CAREWare. Each message type imports different data into CAREWare. There are checks to make sure that all required data elements needed for particular imports are mapped prior to allowing the import to proceed. For example, before importing a diagnosis, CAREWare must know four required elements: the domain, the patient, the diagnosis, and the diagnosis date. The interface resolves the domain and client in the *Map Provider* and *Map Client* indexes. The two remaining elements are resolved by mappings in the *Process Records* index. Once all four are recognized, the import moves forward.

As a special case of import, CAREWare imports services from ORU messages. The ORU segments contain information that distinguishes from the normal ORU messages which import labs, are built with service codes in the OBX 3.1 segments. The relevant indexes created for the service import are PWX_Map_Provider, PWX_Map_Client and PWX_Process_Records.

Generic Mappings

The generic mapping feature offers a way for users to specify any field in the HL7 message as a value they want to associate with a particular client field. User only needs to select a client field called “field mapping” and then define the segment and position in the HL7 message for the value source. CAREWare will use this information to link the values. While this enables the field mappings to be flexible, there are certain restrictions on the flexibility.

The interface creates some default mappings when a user activates an index. The user can adjust and add to these field mappings as necessary. For example, a user can import appointment records from the HL7 and have them stored as services in the CAREWare client record, and the user can choose which value in the message (a particular doctor’s name, a location, or an insurance type) should be used to map to the CAREWare subservice field. Once CAREWare imports the completed appointment, if no service exists for this appointment, CAREWare will create the service based on the mappings.

Default Mappings

There are a few default mappings associated with each index (so that users don’t have to start from scratch every time they activate this module). The default mappings also ensure that the fields required to import data into CAREWare are defined. The tables below list the default mappings associated with each index. Some indexes do not have default mappings.

HL7 Make Document Stubs

Field Mapping Label	Segment	Position	Usage
Provider_id	MSH	5.0	Match CAREWare domain
Alt_provider_id	MSH	4.0	Specifies the provider ID to use if the default value is blank
Match_ptn_id	PID	2.0	Match patients

Alt_match_ptn_id	PID	4.0	Specifies the alternate patient identifier to use if default is blank
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Map_Client for ADT, SCH, PWX, IMM, MDC and BAR

Field Mapping Label	Segment	Position	Usage	Default Values
Map_cl_gnd_rfk	PID	8.0	Match gender	F = Female M = Male O = Other U = Unknown
Race	PID	10.0	Match race	W = White B = Black A = Asian I = Indian O = Other U = Unknown
Map_cl_stt_rfk	PID	11.3	Match state	
Dgn_dgn_df_fk	DG1	3.0	Match diagnosis	Has all diagnoses listed in current diagnosis definitions table. Mapping uses ICD9 codes
Diagnosis_Type	DG1	6.0	Used to filter for final types of diagnosis	A = Admitting W = Working F = Final

Map_Client for ORU

Field Mapping Label	Segment	Position	Usage	Default Values
Map_cl_gnd_rfk	PID	8.0	Match gender	F = Female M = Male O = Other U = Unknown
Race	PID	10.0	Match race	W = White B = Black A = Asian I = Indian O = Other U = Unknown
Map_cl_stt_rfk	PID	11.3	Match states	

Process Records ADT

Field Mapping Label	Segment	Position	Description	Default Values
Map_cl_gnd_rfk	PID	8.0	Match gender	F = Female M = Male O = Other U = Unknown

Race	PID	10.0	Match race	W = White B = Black A = Asian I = Indian O = Other U = Unknown
Map_cl_stt_rfk	PID	11.3	Match state	
Mrn	MRG	1.0	Match previous patient ID	
Acct	MRG	3.0	Match previous account number	
Patient_Class	PV1	2.0	Specifies the patient class field. Used in conjunction with patient type to determine the admission type	E = Emergency I = Inpatient O = Outpatient P = Preadmit R = Recurring B = Obstetrics C = Commercial N = N/A U = Unknown
Patient_Type	PV1	18.0	Specifies the patient type. Used in conjunction with patient class to determine the admission type	E = Emergency I = Inpatient O = Outpatient P = Preadmit R = Recurring B = Obstetrics C = Commercial N = N/A U = Unknown
Admission_type	PV1	4.0	Specifies hospital admission type. Used to determine whether or not admission is an emergency visit	A = Accident E = Emergency L = Labor and Delivery R = Routine C = Elective N = Newborn U = Urgent
Dgn_comment	PV1	17.1	Specifies doctors name to be added to comments	
Vtl_sg_pk	PID	18.0	Holds the patient account number. Used to identify a hospital admission	
Vtl_sg_date	PV1	44.0	Holds the date of admission	
Vtl_sg_notes	PV2	3.1	Holds the admission reason	

dischargeDate	PV1	45	Holds the date of discharge	
Dgn_dgn_df_fk	DG1	3.0	Match diagnosis	Will have all diagnosis listed mapped by ICD9 Codes in current diagnosis definitions table.
Diagnosis_Type	DG1	6.0	Used to filter for final types of diagnosis	A = Admitting W = Working F = Final
Dgn_date	DG1	5.0	Used as the diagnosis date	

Process Records BAR

Field Mapping Label	Segment	Position	Description	Default Values
Dgn_dgn_df_fk	DG1	3.0	Match diagnosis	Has all diagnoses listed in current diagnosis definitions table. Mapping uses ICD9 codes
Diagnosis_Type	DG1	6.0	Used to filter for final types of diagnosis	A = Admitting W = Working F = Final
Dgn_date	DG1	5.0	Used as the diagnosis date	

Process Records SCH

Field Mapping Label	Segment	Position	Description	Default Values
Dgn_dgn_df_fk	DG1	3.0	match diagnosis	Has all diagnoses listed in current diagnosis definitions table. Mapping uses ICD9 codes
Diagnosis_Type	DG1	6.0	Used to filter for final types of diagnosis	A = Admitting W = Working F = Final
Dgn_date	DG1	5.0	Used as the diagnosis date	
App_time_scheduled	AIG	8.0	Used to set the appointment time	
Map_sb_sbs_fk	AIG	3.0	Used to specify the type of subservice for appointment	Has all subservice for contract based on domain
App_pk	SCH	1.0	Used to identify a specific appointment	
Visit_Units	SCH	9.0	Used to update service quantity	

Filler_Status_Code	SCH	25.0	Identifies the status of the appointment	Pending = Pending Waitlist = Waitlist Booked = Booked Started = Started Overbooked = Overbooked DC = DC Deleted = Deleted Blocked = Blocked Canceled = Canceled Complete = Complete
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Process Records MDC

Field Mapping Label	Segment	Position	Description	Default Values
mdc_quantity	RXE	1.0	Used to for quantity	
mdc_frq_rfk	RXE	1.1	Used for medication frequency	To be added
mdc_start_date	RXE	1.3	Used as the medication start date	
mdc_end_date	RXE	1.4	Used as medication end date	
mdc_avl_md_fk	RXE	2.0	Used to specify the type of available medication	Has all medication definitions based on domain
mdc_units	RXE	5.0	Used to specify units	
mdc_pd_md_frm_fk	RXE	6.0	Used to specify medication form	
mdc_instructions	RXE	7.0	Used to specify medication instructions	
mdc_strength	RXE	25.0	Used to specify strength for a medication	
mdc_ind_rfk	RXE	27.0	Specifies medication Indication	Has all indications available within the domain
mdc_prp_rfk	RXE	27.1	Specified medication prophylaxis	Has all prophylaxis available within the domain

Process Records IMM

Field Mapping Label	Segment	Position	Description	Default Values
imm_date	RXA	3.0	Used to retrieve the immunization date	
Imm_imm_df_fk	RXA	5.0	Used the retrieve immunization definition	Has all immunization definitions available within the domain

Process Records PWX

Field Mapping Label	Segment	Position	Description	Default Values
srv_date	PV1	44.0	Used to retrieve the immunization date	

cnt_sb_pk	ORU	3.0	Used the subservice contract information	Has all subservices for contract based on domain
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