HL7

Definition

Health Level 7 (HL7) is an international standard for the transmission of medical data and the name of the organization responsible for maintaining and growing this standard (among other things).

- See the HL7 definition on Wikipedia

HL7 in OpenMRS

Available Message Parsers

- ORUR01Handler: Built into core
  - Does not support the entire r01 specification
  - See below for example messages
  - Used by the FormEntry Module to process INFopath forms and xforms (HTML Form Entry is not using HL7)
- ADTA28: Built into core
  - (Link to page describing what is implemented)
  - (Link to other parsers developed by the community??)

Adding Custom Parsers

See Custom HL7 Handlers

Importing

Read about the HL7 Import Process.

Different options to get into that import process:

1. Use the REST Module and its HL7 resource to post a message using curl or some other web service client.
2. Posting an HL7 message to url /remotecommunication/postHi7.form will insert the message into the hi7 in queue.
   - username: username to authenticate and save the message with
   - password: password to authenticate and save the message with
   - source: Name of an HL7Source in the system (A "LOCAL" hi7 source is shipped by default with openmrs)
   - hi7Message: The hi7 message to save
   - (Note: This was broken in 1.5.0, fixed against in 1.5.1 and 1.6+)
3. Using the API, a message can be parsed with Context.getHL7Service().parseHL7String(String) --> processHL7Message(Message);

There might be a www.mirthcorp.com/community-overview Mirth module that uses the Web Services to create data in openmrs. In this case, hi7 messages would be posted to the mirth server, mirth would parse them and create the objects in openmrs via the web services.

Example Observation (ORU^R01) Message

Sample Message:

```
MSH|\~\&|F0RMENTRY|AMRS|HL7LISTENER|AMRS|20050217152845|ORU^R01|AMRS20050217152845|P|2.5|1|AMRS\~ELDORET|^~\&|AMRS\~MT9^M10|Patient^Jonny^Dee{^}|Patient^Momma^Thee^"^\MS|20040101000000^Y|M|B|555 Johnson Road^Apt.555^Indianapolis^IN^46202^USA|TRIBE CODE|2005021714000
0|1|AMRS\~TRIBE CODE
ORC|RE|20050221130000|"Enterer^Ima^"^AMRS
OBR|1|CE|1238^MEDICAL RECORD OBSERVATIONS^DCT|1|207^DEPRESSION^DCT|0|10^cells/mm3|10-1500|L|F|20050217204000
OBX|1|SN|5089^WEIGHT (KG)^DCT|<10|cells/mm3|10-1500|L|F|20050217204000
OBX|2|SN|5497^CD4 COUNT^DCT|25|kg|20-300|L|F|20050217204000
OBX|3|SN|5089^WEIGHT (KG)^DCT|25|kg|20-300|L|F|20050217204000
OBX|4|TS|1191^HISTORICAL DRUG STOP DATE^DCT|20050101|0|1|F|20050217204000
```

Sample Acknowledgement:
MSH (Message Header) Key:

- **MSH**
  - Message type (message header) and next character is the field separator

- **~
  - Encoding characters
  - \^ component separator
  - ~ repetition separator
  - \ escape character
  - \& subcomponent separator

- **FORMENTRY**
  - Sending Application

- **AMRS**
  - Sending Facility

- **HL7LISTENER**
  - Receiving Application

- **AMRS**
  - Receiving Facility

- **20050217152845**
  - Date/Time of Message (YYYYMMDDHHMMSS)

- **ORU^R01**
  - Message Type (ORU = Unsolicited Transmission of an observation message)

  - Event Type (R01 = Unsolicited Transmission of an observation message)

  - AMRS20050217152845
  - Message Control ID (Unique identifier, RMRS uses sender + DT Stamp.. this is the "link" to the ACK, so we do need this)

  - P
  - Processing ID

  - 2.5
  - Version ID (HL7 version we're compliant with)

  - 1
  - Sequence Number (if we wanted to send a "batch" of these messages, we could append each encounter with a sequential number). otherwise, always list 1.

  - Continuation Pointer (not necessary)

  - Accept Acknowledgement Type (not necessary)

  - Application Acknowledgement Type (not necessary)

  - Country Code (not necessary)

  - Character Set (not necessary)

  - Principal Language of Message (not necessary)

  - Alternate Character Set Handling Schema (not necessary)

  - 1^AMRS-ELDORET^http://schemas.openmrs.org/2006/FormEntry/formId^URI
Message Profile Identifier (1 = form.form_id)
^ Unique System ID
^ Namespace of assigning authority
^ Universal ID type

EVT (Event) Key (currently not implemented in OpenMRS):

```
EVT||20050221130000||10^^^^^^^^^^9^M10^^AMRS
```

- EVN
  - Message type (event)
- Event Type Code
- 20050221130000
  - Recorded Date/Time
- Date/Time Planned Event
- Event Reason Code
- 10^^^^^^^^^^9^M10^^AMRS
  - Operator (10 = User ID (Erica))
    ^ Family Name
    ^ Given Name
    ^ Middle Name
    ^ Suffix
    ^ Prefix
    ^ Degree
    ^ Source Table
    ^ Assigning Authority
    ^ Name Type Code
    ^ Identifier Check Digit (9)
    ^ Check Digit Scheme (M10)
    ^ Identifier Type Code
    ^ Assigning Facility (AMRS)

PID (Patient Identification) Key:

```
PID||1MT^0^M10||Patient^Jonny^Dee^DR|Patient^Momma^Thee^MS|20040101000000|M||B|555 Johnson Road^Apt. 555^Indianapolis^IN^46202^USA|||||||||||Indianapolis, IN|||||||||||||||||TRIBE CODE
```

- PID
  - Message type (patient identification)
- Set-ID (not necessary in our system.. we could represent multiple PIDs from different systems with multiple PID segments, one from each system with this)
- Patient ID (older version of identifier representation.. no longer used commonly)
- 1MT^0^M10
  - ID Number (1MT)
    ^ Check Digit (0)
    ^ Check Digit Scheme (M10)
    ^ Assigning Authority (hopefully won't have to use.. but if we need multiples)
    // a ~ would separate multiple occurrences of PIDs
- Alternate Patient ID (older version of identifier representation.. no longer used commonly)
- Patient^Jonny^Dee^DR
  - Family Name (Patient)
    ^ Given Name (Jonny)
    ^ Second / Middle Name (Dee)
    ^ Suffix ()
    ^ Prefix (DR)
- Patient^Momma^Thee^MS
  - Mother's Maiden Family Name (Patient)
    ^ Given Name (Momma)
    ^ Second / Middle Name (Thee)
    ^ Suffix ()
    ^ Prefix (MS)
• 20040101000000
  Date/Time of Birth (YYYYMMDDHHMMSS)
  ^ Degree of Precision (for our purposes Y = estimated, and null = actual)

• M
  Administrative Sex (M) .. M, F, O, U, A, N possible answers

• Patient Alias (older version.. no longer used commonly)

• B
  Race (B) .. I, A, B, W, N, O possible answers

• 555 Johnson Road^Apt. 555^Indianapolis^IN^46202^USA
  Street Address
  ^ Other Designation
  ^ City
  ^ State
  ^ Zip

• Country Code (older version.. no longer used commonly)

• Phone Number (Home)

• Phone Number (Business)

• Primary Language

• Marital Status

• Religion

• SSN - Patient (older.. use PID-3 for this, store here for BW compat)

• Driver's License Number - Patient (older.. use PID-3 for this, store here for BW compat)

• Mother's Identifier

• Ethnic Group

• Indianapolis, IN
  Birth Place

• Multiple Birth Indicator

• Birth Order

• Citizenship

• Veteran Military Status

• Nationality

• Patient Death Date and Time

• Patient Death Indicator

• Identity Unknown Indicator

• Identity Reliability Code

• Last Update Date/Time

• Last Update Facility

• Species Code

• Breed Code

• Strain

• Production Class Code

• Tribal Citizenship (here is where we can list the tribe.. it's loosely defined in HL7.. we could just send the code from our list with this)

PV1 (Patient Visit) Key:

PV1|1|O|^^^^^MTRH^1^AMRS|2|||1^Mamlin^Joseph^^^^^^^8^M10^AMRS|_________________________________________||20050217140000|____V
This message creates an encounter in OpenMRS.

- PV1
  Message type (patient visit)
- 1
  Sub ID (1)
- O
  Patient Class (O = Outpatient)
- ^^^^^^^MTRH^1^AMRS|
  Assigned Patient Location (1=MTRH)
- 2
  Admission Type (2 = Return)
- Preadmit Number
- Prior Patient Location
- ^1^Mamlin^Joseph^^^^^^^^8^M10^^AMRS|
  Attending Doctor ID (1)
  ^ Family Name (Mamlin)
  ^ Given Name (Joseph)
  ^ Middle Name
  ^ Suffix
  ^ Degree
  ^ Source Table
  ^ Assigning Authority
  ^ Name Type Code
  ^ Identifier Check Digit (8)
  ^ Check Digit Scheme (M10)
  ^ Identifier Type Code
  ^ Assigning Facility (AMRS)
- Referring Doctor
- Consulting Doctor
- Hospital Service
- Temporary Location
- PreAdmit Test Indicator
- ReAdmission Indicator
- Admit Source
- Ambulatory Status
- VIP Indicator
- Admitting Doctor
- Patient Type
- Visit Number
- Financial Class
- Charge Price Indicator
- Courtesy Code
- Credit Rating
- Contract Code
- Contract Effective Date
- Contract Amount
- Contract Period
- Interest Code
- Transfer to Bad Debt Code
• Transfer to Bad Debt Date
• Bad Debt Agency Code
• Bad Debt Transfer Amount
• Bad Debt Recovery Amount
• Delete Account Indicator
• Delete Account Date
• Discharge Disposition
• Discharge to Location
• Diet Type
• Servicing Facility
• Bed Status
• Account Status
• Pending Location
• Prior Temporary Location
• 20050217140000|
  Admit Date/Time
• Discharge Date/Time
• Current patient balance
• Total charges
• Total adjustments
• Total payments
• Alternate visit ID

  V
  Visit indicator (V = visit level, A = account level)

ORC (Common Order Segment):

ORC(RE)||||20050221130000|1^Enterer^Ima^^^^^AMRS

NOTE: The optional ORC segment is used to transmit enterer and date-entered information in the message.

• ORC|
  Message type (common order request)
• RE|
  Order Control (RE = observations to follow)
• Placer Order Number
• Filler Order Number
• Placer Group Number
• Order Status
• Response Flag
• Quantity/Timing
• Parent
• 20050221130000|
  Date/Time of Transaction
• 1^Enterer^Ima^AMRS
  Entered By ID (1)
**OBR (Observation Request) Key:**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBR</td>
<td>Message type (observation request)</td>
</tr>
<tr>
<td>1</td>
<td>Set ID (1) .. sequential number given to each subsequent OBR.</td>
</tr>
<tr>
<td>Placer Order Number</td>
<td></td>
</tr>
<tr>
<td>Filler Order Number</td>
<td></td>
</tr>
<tr>
<td>1238^MEDICAL RECORD OBSERVATIONS^DCT</td>
<td>Identifier (1238)</td>
</tr>
<tr>
<td>Text (MEDICAL RECORD OBSERVATIONS)</td>
<td></td>
</tr>
<tr>
<td>Name of Coding System (DCT)</td>
<td></td>
</tr>
<tr>
<td>Priority</td>
<td></td>
</tr>
<tr>
<td>Requested Date/Time</td>
<td></td>
</tr>
</tbody>
</table>

**OBX / CE (Observation Result, Coded Datatype) Key:**

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBX</td>
<td>Message type</td>
</tr>
<tr>
<td>1</td>
<td>Set ID .. sequential number given to each subsequent OBX within the series.</td>
</tr>
<tr>
<td>CE</td>
<td>Coded datatype</td>
</tr>
<tr>
<td>1082^REVIEW OF SYSTEMS, CENTRAL NERVOUS SYSTEM^DCT</td>
<td>Concept ID (1082)</td>
</tr>
<tr>
<td>Text Description (REVIEW OF SYSTEMS)</td>
<td></td>
</tr>
<tr>
<td>Name of Coding System (DCT)</td>
<td></td>
</tr>
<tr>
<td>Sub-ID</td>
<td></td>
</tr>
<tr>
<td>207^DEPRESSION^DCT</td>
<td>Concept ID (207)</td>
</tr>
<tr>
<td>Text Description (DEPRESSION)</td>
<td></td>
</tr>
<tr>
<td>Name of Coding System (DCT)</td>
<td></td>
</tr>
<tr>
<td>Units</td>
<td></td>
</tr>
<tr>
<td>References Range</td>
<td></td>
</tr>
<tr>
<td>Abnormal Flags</td>
<td></td>
</tr>
<tr>
<td>Probability</td>
<td></td>
</tr>
<tr>
<td>Nature of Abnormal Test</td>
<td></td>
</tr>
</tbody>
</table>
• Observation Result Status
• Effective Date
• User Defined Access Checks
• 20050217204000
  Date/Time of Observation

OBX / SN (Observation Result, Structured Numeric Datatype) Key:

```
OBX|2|SN|5497^CD4 COUNT^DCT||<^10|cells/mm3|10-1500|L|||F|||20050217204000
```

• OBX|
  Message type

• 2|
  Set ID ... sequential number given to each subsequent OBX within the series.

• SN|
  Coded datatype

• 5497^CD4 COUNT^DCT|
  Concept ID (5497)
  ^ Text Description (CD4 COUNT)
  ^ Name of Coding System (DCT)

• Sub-ID

• <^10|
  Comparator (<)
  ^ Value 1 (10)

• cells/mm3
  Units

• 10-1500|
  References Range

• L|
  Abnormal Flags (we can decide if we want to use this one)

• Probability

• Nature of Abnormal Test

• Observation Result Status
• Effective Date

• User Defined Access Checks
• 20050217204000
  Date/Time of Observation

OBX / NM (Observation Result, Numeric Datatype) Key:

```
OBX|3|NM|5089^WEIGHT (KG)^DCT||25|kg|20-300|L|||F|||20050217204000
```

• OBX|
  Message type

• 3|
  Set ID ... sequential number given to each subsequent OBX within the series.

• NM|
  Coded datatype

• 5089^WEIGHT (KG)^DCT|
  Concept ID (5089)
  ^ Text Description (WEIGHT (KG))
  ^ Name of Coding System (DCT)

• Sub-ID
• 25| Value (25)
• kg| Units
• 20-300| References Range
• L| Abnormal Flags (we can decide if we want to use this one)
• Probability
• Nature of Abnormal Test
• Observation Result Status
• Effective Date
• User Defined Access Checks
• 20050217204000| Date/Time of Observation

OBX / NM (Observation Result, Timestamp Datatype) Key:

OBX|4|TS|1191^HISTORICAL DRUG STOP DATE^DCT||20050101||||||F|||20050217204000

• OBX| Message type
• 4| Set ID ... sequential number given to each subsequent OBX within the series.
• TS| Timestamp datatype
• 1191^HISTORICAL DRUG STOP DATE^DCT| Concept ID (1191)

^ Text Description (HISTORICAL DRUG STOP DATE)
^ Name of Coding System (DCT)

• Sub-ID
• 20050101| DateTime could be of the form (YYYYMMDD) or (YYYYMMDDHHMMSS)
• Units
• References Range
• L| Abnormal Flags (we can decide if we want to use this one)
• Probability
• Nature of Abnormal Test
• Observation Result Status
• Effective Date
• User Defined Access Checks
• 20050217204000| Date/Time of Observation

MSA (Message Acknowledgement) Key:

MSA|AR|AMRS20050217152845|

• MSA| Message Header (Acknowledgement Segment)
Acknowledgement Code (AR)

HL7 Table 0008 has the list of possible values, but in our case, we only care about 3 (I think):

- AA = Application Accept
- AE = Application Error
- AR = Application Reject

In this case, the message notes that this message was rejected, b/c the MRN had an invalid check digit.

- AMRS20050217152845
  Message Control ID (this comes from the MSH segment Control-ID and provides the linkage)

ERR (Error Segment) Key:

This segment is used to add specific error comments to acknowledgement messages:

```
ERR|PID^1^3^^2|204|E
```

- ERR|
  Message type (error segment)

- PID^1^3^^2|
  Error Location Segment ID (PID)
  ^ Segment Sequence (1)
  ^ Field Position (3)
  ^ Field Repetition
  ^ Component Number (2)
  ^ Subcomponent Number

(in this example.. patient has an incorrect check digit.. It should be '0' 😞)

- 204|
  HL7 Error Code (204)

HL7 Table 0357 lists the possible codes, 204 is "unknown key identifier"

- E|
  Severity (E)

W = Warning, I = Information, E = Error

Example of Grouped Observations

Here's an example of what we're headed for grouped observations (see COMPLETE BLOOD COUNT below). To be valid HL7, the enterer and datetime for data entry either need to move from the ORC to OBR segments or the ORC needs to be repeated for each OBR. --Burke 12:24, 9 August 2006 (EDT)

```
MSH|^~\&|FORMENTRY|AMRS|HL7LISTENER|AMRS|20060809121931||ORU^R01|formentry-20060809121931|P|2.5|1|1|1|1|1|1|2^AMRS-ELDORP|http://schema.openmrs.org/2006/FormEntry/formId^URI
PID|||1^^^AMRS-ELDORPopenmrs.orgDNS^||Patient^John^D||
PV1||0|1^Unknown||2^Ima Doc (2-6)|||20060807161605|1^Super User
ORC|RE|||20060807161605|1^Super User
OBR|1|||1238^MEDICAL RECORD OBSERVATIONS^99DCT
OBX|1|NM|5089^WEIGHT (KG)^99DCT||70|||20060807
OBR|2|||1019^COMPLETE BLOOD COUNT^99DCT
OBX|1|NM|1015^HEMATOCRIT^99DCT||1000|||20060807
OBX|2|NM|21^HEMOGLOBIN^99DCT||1000|||20060807
OBX|3|NM|678^WHITE BLOOD CELLS^99DCT||100000|||20060807
OBX|4|NM|729^PLATELETS^99DCT||10|||20060807
OBR|3|||1284^PROBLEM LIST^99DCT
OBX|1|CWE|6042^PROBLEM ADDED^99DCT|2^ANEMIA, HEMOLYSIS^99DCT|20060807
```

Other Examples
To successfully process a ADT_A28 message is required specified within the PID-3 segment the (HD)> <assigning Authority>, in this case "Old Identification Number”

<table>
<thead>
<tr>
<th>ADT_A28</th>
</tr>
</thead>
</table>
| MSH|\^\&|sistemaExterno||EXTERNAL|EXTHL7|2009112310300^0|HUP|ADT^A28^ADT_A05|9166768|P|2.5|1||AL||ASCII
| EVN|A28|20091123101300||1
| PID||4^^^Old Identification Number||FARMACIA^UNO^PACIENTE||20011114|M||20371^02^2400^724|||724^Y|||02||11|20371|724^ESPA?A^N||N
| PV1|1|I
| PV2||||||||724^Y|||02|||11|20371|724^ESPA?A^N||N
| GT1|1|||^\^\^T

<table>
<thead>
<tr>
<th>ORU_R01</th>
</tr>
</thead>
</table>
| MSH|\^\&|FORMENTRY|AMRS|HL7LISTENER|AMRS|20060809121931||ORU^R01|formentry-20060809121931|P|2.5|1|||2^AMRS-ELDOR^http://schema.openmrs.org/2006/FormEntry/formId^URI
| PID||3^\^\^|Patient^John^D||
| PV1|0|1^Unknown||2^Ima Doc (2-6)|||20060807|20060807||V
| ORC|RE|1||20060807161605|1^Super User
| OBR|1||1238^MEDICAL RECORD OBSERVATIONS^99DCT
| OBX|1|NM|5089^WEIGHT (KG)^99DCT||70|||20060807
| OBR|2||1019^COMPLETE BLOOD COUNT^99DCT
| OBX|1|NM|21^HEMOGLOBIN^99DCT||1000|||20060807
| OBR|2|NM|21^HEMATOCRIT^99DCT||1000|||20060807
| OBR|3|NM|678^WHITE BLOOD CELLS^99DCT||100000|||20060807
| OBX|2|NM|729^PLATELETS^99DCT||10|||20060807
| OBR|3|1284^PROBLEM LIST^99DCT
| OBX|1|CWE|6042^PROBLEM ADDED^99DCT|2^ANEMIA, HEMOLYSIS^99DCT|||20060807

Resources

- Team members can download HL7 documentation from resources.openmrs.org/download using their SVN username/password
- Gunther Schadow's HL7 page has some nice summaries of message syntax and code tables