BEA WebLogic Adapter for HL7

User Guide

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BEA WebLogic Adapter for HL7 User Guide

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About This Document

The *BEA WebLogic Adapter for HL7 User Guide* is organized as follows:

- Chapter 1, "Introduction to HL7," introduces the BEA WebLogic Adapter for HL7, describes its features, and gives an overview of how it works.
- Chapter 2, "Metadata, Schemas, and Repositories," describes metadata, how to name a schema repository and the schema manifest, how to create a schema, how to store directory and template files for transformations.
- Chapter 3, "Defining an Application View for the BEA WebLogic Adapter for HL7," describes how application views are created.
- Chapter 4, "Service and Event Configuration," describes how to add services and events to application views.
- Chapter 5, "BEA WebLogic Adapter for HL7 Integration Using Business Process Management," describes how events are incorporated into workflow design.
- Chapter 6, "Writing and Editing Rule Specification Files," describes how rules files work with the validation engine and how these files can be customized to suit an enterprise's needs.
- Appendix A, "HL7 Document Index," documents reference material supplied with the BEA WebLogic Adapter for HL7.

What You Need to Know

This document is written for system integrators who develop client interfaces between HL7 and other applications. It describes how to use the BEA WebLogic Adapter for HL7 and how to develop application environments with specific focus on message integration. It is assumed that readers know Web technologies and have a general understanding of Microsoft Windows and UNIX systems.

Related Information

The following documents provide additional information for the associated software components:

- *BEA WebLogic Adapter for HL7 Installation and Configuration Guide*
- *BEA WebLogic Adapter for HL7 Release Notes*
- *BEA Application Explorer Installation Guide*
- BEA WebLogic Server installation and user documentation, which is available at the following URL:

  `http://edocs.bea.com/more_wls.html`
- BEA WebLogic Integration installation and user documentation, which is available at the following URL:

  `http://edocs.bea.com/more_wli.html`

Contact Us!

Your feedback on the BEA WebLogic Adapter for HL7 documentation is important to us. Send us e-mail at docsupport@bea.com if you have questions or comments. Your comments will be reviewed directly by the BEA professionals who create and update the BEA WebLogic Adapter for HL7 documentation.

In your e-mail message, please indicate which version of the BEA WebLogic Adapter for HL7 documentation you are using.

If you have any questions about this version of the BEA WebLogic Adapter for HL7, or if you have problems using the BEA WebLogic Adapter for HL7, contact BEA Customer Support through BEA WebSupport at www.bea.com. You can also contact Customer Support by using the contact information provided on the Customer Support Card, which is included in the product package.

When contacting Customer Support, be prepared to provide the following information:

- Your name, e-mail address, phone number, and fax number
- Your company name and company address
- Your machine type and authorization codes
- The name and version of the product you are using
- A description of the problem and the content of pertinent error messages

Documentation Conventions

The following documentation conventions are used throughout this document.

Convention	Item
boldface text	Indicates terms defined in the glossary.
Ctrl+Tab	Indicates that you must press two or more keys simultaneously.
italics	Indicates emphasis or book titles.

`monospace text`	Indicates code samples, commands and their options, data structures and their members, data types, directories, and file names and their extensions. Monospace text also indicates text that you must enter from the keyboard.
	Examples:
	`#include <iostream.h> void main ( ) the pointer psz`
	`chmod u+w *`
	`\tux\data\ap`
	`.doc`
	`tux.doc`
	`BITMAP`
	`float`

`monospace boldface text`	Identifies significant words in code. *Example*: `void` **`commit`** `( )`
`monospace italic text`	Identifies variables in code. *Example*: `String` *`expr`*
UPPERCASE TEXT	Indicates device names, environment variables, and logical operators. *Examples*: LPT1 SIGNON OR

Convention	Item
{ }	Indicates a set of choices in a syntax line. The braces themselves should never be typed.
[ ]	Indicates optional items in a syntax line. The brackets themselves should never be typed. *Example*: `buildobjclient [-v] [-o name ] [-f file-list]... [-l file-list]...`
|	Separates mutually exclusive choices in a syntax line. The symbol itself should never be typed.
. . .	Indicates one of the following in a command line: ■ That an argument can be repeated several times in a command line ■ That the statement omits additional optional arguments ■ That you can enter additional parameters, values, or other information The ellipsis itself should never be typed. *Example*: `buildobjclient [-v] [-o name ] [-f file-list]... [-l file-list]...`
. . .	Indicates the omission of items from a code example or from a syntax line. The vertical ellipsis itself should never be typed.

CHAPTER

1 Introduction to HL7

This section introduces Health Level Seven (HL7) and the BEA WebLogic Adapter for HL7. It includes the following topics:

- The Health Level Seven Standard
- The BEA WebLogic Adapter for HL7
- WebLogic Integration and HL7
- Process Flow for the BEA WebLogic Adapter for HL7
- Rules Files
- EDI to XML Transformation
- Components of the BEA WebLogic Adapter for HL7
- HL7 Validation Processing
- Configuration

The Health Level Seven Standard

Health Level Seven (HL7) was founded in 1987 to develop standards for the electronic interchange of clinical, financial, and administrative information. The standards were developed for electronic interchange between independent healthcare oriented computer systems such as hospital information systems, clinical laboratory systems, enterprise systems, and pharmacy systems. Between 1999 and 2002, HL7's membership increased to over 1,700 hospital, professional society, healthcare industry, and individual members, including almost all of the major healthcare systems' consultants and vendors.

The HL7 Standard is followed in the majority of large hospitals in the United States today. It is also followed in Australia, Austria, Belgium, Finland, Germany, Holland, Israel, Japan, New Zealand, the Netherlands, and the United Kingdom.

The HL7 Standard defines transactions for transmitting data about:

- Patient registration, admission, discharge and transfers
- Patient insurance, charges, and payers
- Laboratory orders and tests results
- Image studies,
- Nursing and physician observations
- Diet, pharmacy, and supply orders
- Master files
- Appointment scheduling
- Problem lists
- Clinical trial enrollments
- Patient permissions
- Voice dictations, advanced directives, and physiologic signals.

Three versions of HL7 are supported by the BEA WebLogic Adapter for HL7: Version 2.3, Version 2.3.1, and Version 2.4.

The BEA WebLogic Adapter for HL7

The BEA WebLogic Adapter for HL7 allows for fast integration of HL7 EDI transactions into your existing environment. This enables developers to parse, transform, validate, store, and integrate healthcare information into the existing enterprise and pass information to partners electronically, in the form mandated by HL7.

To enable fast integration, BEA has not only supplied a parser for HL7 EDI documents, but has also supplied pre-built templates that enable developers to convert EDI documents to XML form and XML documents into EDI form. Schemas are required for mapping to or from the EDI format. There are three major components of the BEA WebLogic Adapter for HL7 that enable integration of HL7 into your enterprise:

- Optional protocol support for File, FTP, MQ Series, and HTTP
- The HL7 toolkit containing:
  - XML schemas for versions 2.3, 2.3.1, and 2.4
  - Rules files
- Event and service adapters

Key features of the BEA WebLogic Adapter for HL7 include support for:

- Asynchronous, bidirectional message interactions between WebLogic Integration, FTP servers, and the local file system.
- A business process running within BEA WebLogic Integration to transfer data to and from FTP servers.
- Service (inbound) and event (outbound) adapter integration operations when presenting XML schemas to the business process workflows.
- Batched or zipped message files.

The adapter provides pre-packaged support for HL 7 standard documents, but does not provide out-of-the-box the ability to customize those formats. Please contact BEA professional services if you need to customize these formats.

WebLogic Integration and HL7

The BEA WebLogic Adapter for HL7 transforms HL7 documents into XML format and XML documents into HL7 format.This bi-directional transformation is performed by event and service adapters.

An event is triggered when an HL7 message arrives at a location that was designated when configuring the event listener. The following protocols are supported by the event listener: File System, File Transfer Protocol (FTP), IBM WebSphere MQ Series, Hypertext Transport Protocol (HTTP/HTTPS), and TCP/IP. After the HL7 document is received via one of these protocols, it is transformed to XML and passed to the event router, which is used to trigger workflows in Weblogic Integration Studio.

Service adapters provide the same protocol support for outbound communications (File System and FTP protocols supports read and write operations). An XML document (conforming to the provided schemas) can be transformed into HL7 format and emitted to the configured output location. The File system and FTP protocols also can pick up HL7 documents and convert them to XML prior to being passed back into the workflow.

After the information is in XML format, it can be integrated into back office systems via BEA application, utility, and data adapters, available from the BEA adapter suite of products. J2EE standard interfaces and protocols such as JCA, JDBC, and JMS are also supported with the BEA WebLogic Adapter for HL7. These same adapters can be used to obtain for the information required to populate or augment HL7 messages.

WebLogic Integration is the hub of the BEA WebLogic Adapter for HL7. The Adapter also applies pre-built rules to validate the structure and content of the HL7 document and can build and route an acknowledgement message.

The Adapter provides the capability (optionally) to configure simultaneous multiple listeners such as File, FTP, HTTP/S, and so forth. Their inherent processing services (such as decrypt or transform) are applied per listener for non-XML document types for example, HL7, HIPAA, and EDI.

The Adapter includes processing services performed on XML representations of documents. These services include: encrypt/decrypt, transformation, rules application, and so forth.

Process Flow for the BEA WebLogic Adapter for HL7

When a document is received by the BEA WebLogic Adapter for HL7, it can be processed in a number of ways to aid integration. The BEA WebLogic Adapter for HL7 supports bi-directional transformation using XML as the intermediate protocol. This adapter is supplied with schemas that describe the HL7 document and can be used to map XML-based information to HL7 compliant structure.

Validating HL7 Messages

HL7 messages are validated in two ways. Structure is validated via data dictionaries (.xsd files). The dictionaries are used to parse and validate the structure of the message. Content is validated via a rules engine.

An HL7 document is validated by the use of a rules file. This file is an XML document that applies pre-configured rules to elements in the HL7 message. These rules can be customized, and users can write their own rules to apply additional business logic.

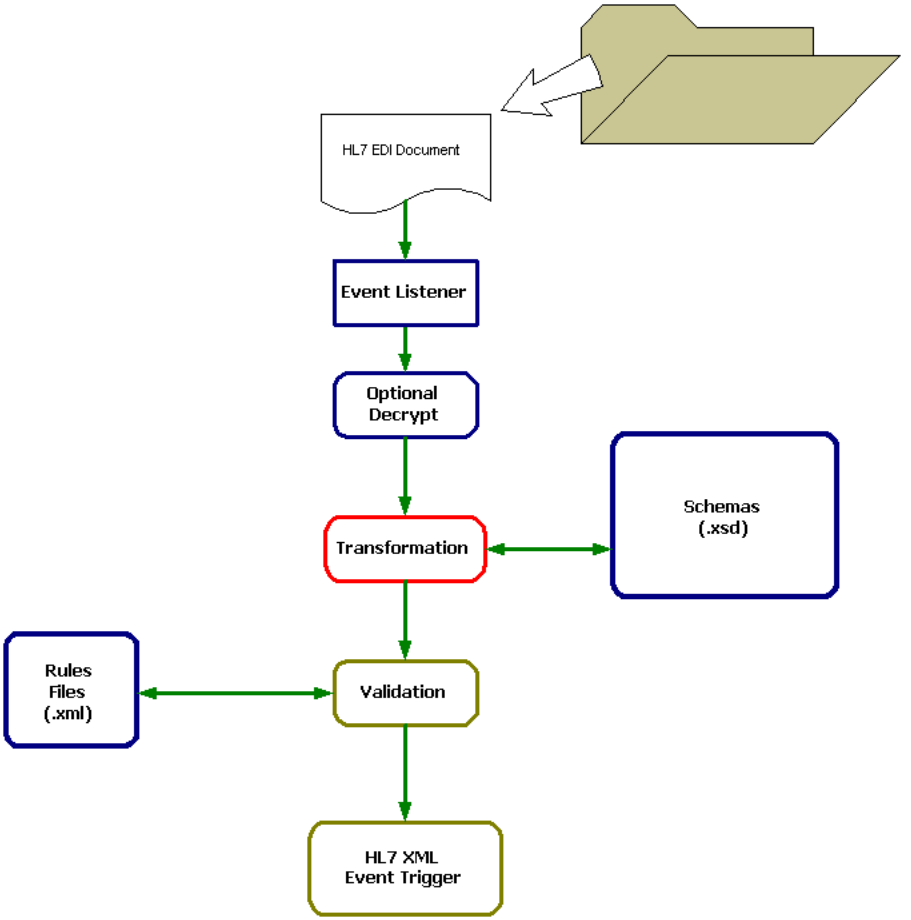
Depending on the direction (for example, to or from HL7 format), the content validation occurs before or after structural validation. The following section describes how the transformation and validation works in inbound (receiving a HL7 message) and outbound (creating a HL7 message) scenarios.

Inbound Processing

The BEA WebLogic Adapter for HL7 “listens” for messages via configurable listeners. The first step in the process is decrypting. This is followed by the pre-parse stage where documents are parsed and converted to XML format using data dictionaries to describe the document. These data dictionaries are in XML format and can be modified to tailor messages to the requirements of an installation (for example, Z segments). The workbench can be used to map the XML to integrate information to back- or front-end systems via WebLogic Integration and other BEA adapters.

The following diagram describes the flow.

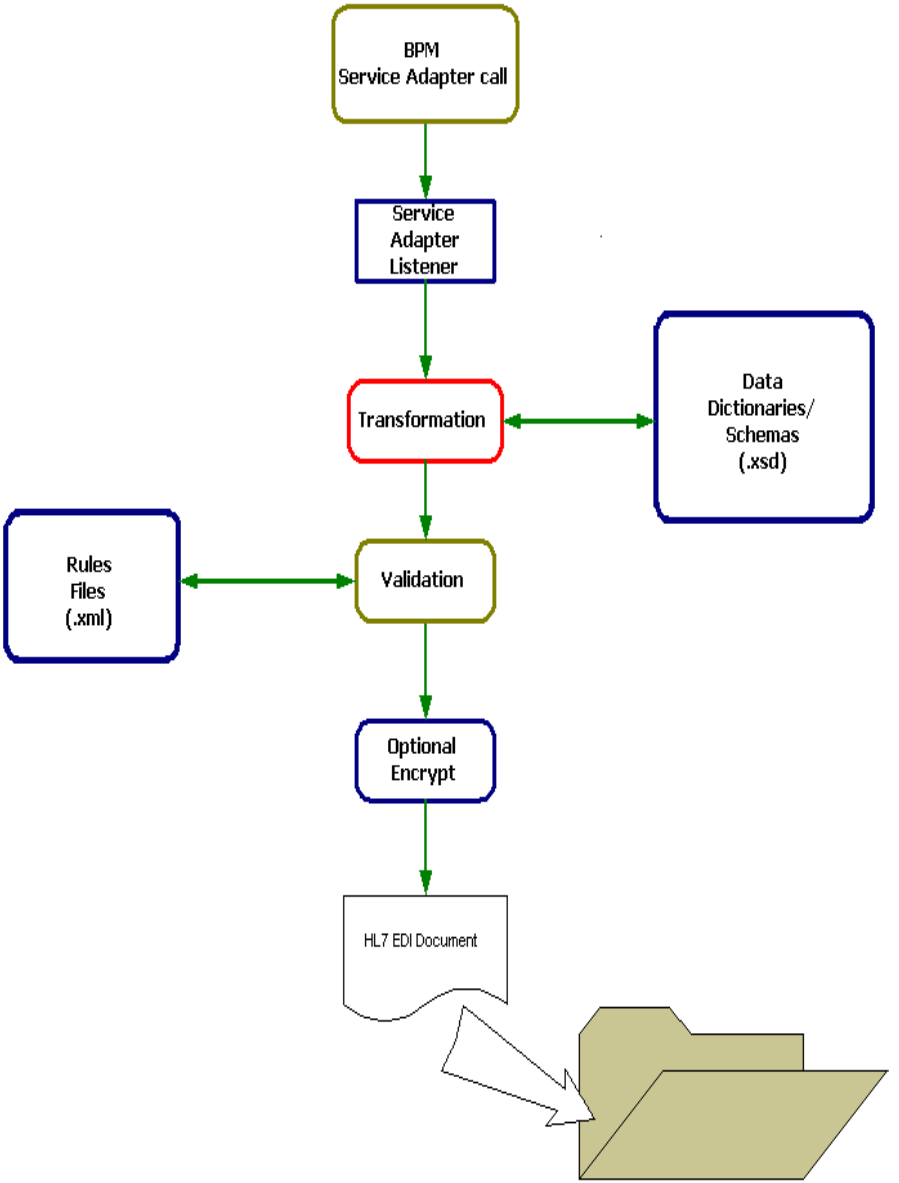
Figure 1-1 Converting an HL7 Document to an XML Document



Outbound Processing

Outbound processing mirrors (in reverse) the inbound process. A document can be received in XML format and have business logic applied. The document then can be validated by the rules engine and transformed into a HL7 document at the pre-emit stage in the process. Inbound and outbound processes also can be run in one pass as illustrated in the following diagram:

Figure 1-2 Converting an XML Document to an HL7 Document



Rules Files

The rules files are pre-built to apply HL7 mandated rules. Rules are applied after the EDI document has been converted to XML. They are associated by the document's root tag with the converted document. The BEA WebLogic Adapter for HL7 is pre-configured to apply these rules to the relevant document. For more information, see Appendix A, "HL7 Document Index."

EDI to XML Transformation

The BEA WebLogic Adapter for HL7 automatically transforms HL7 EDI documents to XML and vice versa. Schemas and sample XML files are also supplied to assist you in developing transformations from non-XML format to HL7 mandated EDI form.

A business process workflow can be used to build templates of business processes to convert to application-specific XML or EDI form.

Components of the BEA WebLogic Adapter for HL7

Sample Messages

For an HL7 message to be converted from HL7 format to XML format, a representation of that message must exist in the data dictionary. The following example describes an acknowledgement message (ACK). The message contains three segments, MSH, MSA, and ERR. Only the first two are mandatory. The third is optional.

None of these segments can be repeated in the message. If a field can be repeated, then the attribute, maxOccurs, will be non-zero; if the number of repetitions is unlimited, the attribute will be set to "unbounded."

```
<!-- MESSAGE ACK -->
<!-- .. message definition ACK -->
<element name="ACK">
              <complexType>
                     <sequence>
                           <element minOccurs="1" maxOccurs="1"
ref="MSH" />
                           <element minOccurs="1" maxOccurs="1"
ref="MSA" />
                           <element minOccurs="0" maxOccurs="1"
ref="ERR" />
                     </sequence>
                </complexType>
</element>
```

Segments

The segment sequence described in the previous section shows which segments make up a valid message. Each segment is further divided into fields that in turn are further divided into components and sub-components.

The following example shows the fields which make up the segment, Accident Segment (ACC).

```
<!-- SEGMENT ACC -->
<element name="ACC">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="ACC_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="ACC_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="ACC_LOCATION" />
       <element minOccurs="0" maxOccurs="1" ref="ACC_AUTO_STATE" />
      <element minOccurs="0" maxOccurs="1" ref="ACC_JOB_IND" />
      <element minOccurs="0" maxOccurs="1" ref="ACC_DEATH_IND" />
    </sequence>
  </complexType>
</element>
```

The same convention is used to identify the fields that are required and those that can be repeated.

Fields

The fields referred to in the previous segments are further described in the fields section of the data dictionary. The ref attribute of the element tag contains a matching value to the reference in the segment document.

Additional attributes indicate whether the data in the field is derived from a lookup table. For example, lookupTab="50" indicates that lookup table 50 holds all of the valid codes for this field.

The type attribute is a reference to the data types section of the data dictionary and enables further qualification of the field.

```
<!-- FIELD ACC_DATETIME -->
<element      ref="ACC_DATETIME"
              lookupTab="0"
              longName="Accident Date/Time"
              type="TS" />

<!-- FIELD ACC_CODE -->
<element      ref="ACC_CODE"
              lookupTab="50"
              longName="Accident Code"
              type="CE_0050" />
```

Data Types

The primitive data types, as the name suggests, are the lowest level of data type. Complex data types are made up of numerous primitive data types.

Z Segments

HL7 allows for the development of segments and messages to address data that the standard does not support. For more information, see the HL7 Standard Version 2.3, Chapter 2, "Control/Query."

When to Create Z Segments

You create Z segments when an interface requires the communication of data currently not defined by the standard. Data currently defined by the standard may *not* be communicated on a Z segment. For example, 'patient name' is currently defined on the PID segment and therefore, cannot be a part of a Z segment.

How to Develop New Z Segments

Observe the following rules when defining Z segments.

1. Include data elements related to a single object (entity) on a segment.
2. Group logically related data, such as patient demographic information, insurance information, or census information. The following are guidelines for identifying related data (listed in preferred usage order):
    a. Group data into Z segments that correspond to entities or objects for example, Visit, Patient, Patient Account.
    b. Group data into Z segments that correspond to tables.
    c. Group data into Z segments that correspond to files.
3. Use existing Z segments before defining new ones.
4. Include an identifier for the Z segment indicating the object of the data or a Z segment preceding it to address identification.
5. Document whether the data should be proposed to the HL7 committee for inclusion in the standard. (If the data is not a unique data requirement for a unique use, then it should be proposed for the standard.)

The following example includes the primitive data types from the example in "Fields" on page 1-10: Time stamp (TS, Identifier (ID)), String (ST), and Lookup From User-Defined Tables (IS). The complex data type CE_0050 is described in terms of its primitive data types.

```
<!-- PRIMITIVE DATATYPE TS -->
<simpleType name="TS">
  <restriction base="string" />
</simpleType>
<!-- PRIMITIVE DATATYPE ID -->
<simpleType name="ID">
  <restriction base="string" />
</simpleType>
<!-- PRIMITIVE DATATYPE ST -->
<simpleType name="ST">
  <restriction base="string" />
</simpleType>
<!-- PRIMITIVE DATATYPE IS -->
<simpleType name="IS">
  <restriction base="string" />
</simpleType>
<!-- COMPOSITE DATATYPE CE_0050 -->
<complexType name="CE_0050">
  <sequence>
    <element minOccurs="0" maxOccurs="1" ref="CE_0050_ID"
      longName="identifier" lookupTab="50" type="ID" />
    <element minOccurs="0" maxOccurs="1" ref="CE_0050_TXT"
      longName="text" lookupTab="0" type="ST" />
    <element minOccurs="0" maxOccurs="1" ref="CE_0050_CODE_SYS"
      longName="name of coding system" lookupTab="396" type="IS" />
    <element minOccurs="0" maxOccurs="1" ref="CE_0050_ALT_ID"
      longName="alternate identifier" lookupTab="0" type="ST" />
    <element minOccurs="0" maxOccurs="1" ref="CE_0050_ALT_TXT"
      longName="alternate text" lookupTab="0" type="ST" />
   <element minOccurs="0" maxOccurs="1" ref="CE_0050_ALT_CODE_SYS"
     longName="name of alternate coding sys" lookupTab="396"
type="IS" />
  </sequence>
</complexType>
```

Event Transport Protocol Options

The WebLogic JSP Console Application View pages are used to configure the receipt (based on incoming protocol) and transformation of an HL7 document.

Functional Acknowledgements are created automatically (for the inbound or event processing) and are then passed to WebLogic Integration for use or routing using business process management functionality.

HL7 Validation Processing

The BEA WebLogic Adapter for HL7 can validate the structure and content of incoming and outgoing documents. This validation goes beyond checking the structure expressed in a schema or DTD and can include content values, complex conditional dependencies of elements, and the balancing of values. Some industries have stringent rules regarding the format of exchanged documents. The Validation Engine helps to meet these requirements without requiring the writing of customized code.

Validation is accomplished by using the BEA WebLogic Adapter for HL7, which includes a set of built-in validation rules. This set of rules provides complete coverage for validating documents related to the adapter type (for example, HL7 and SWIFT). These rules are then invoked as defined by a *Rule Specification file*. A Rule Specification file indicates exactly which of the built-in rules to invoke and to which elements or segments in a document to apply them. Rule Specification files are supplied for HL7 and SWIFT, so the rules processing is automatically set during configuration.

The Rule Specifications are stored in XML format files that are freely accessible in the BEA WebLogic Adapter for HL7 directory structure. Keeping each rule in an external file facilitates the maintenance of existing rules and provides an easy way to add new ones.

Configuration

The BEA WebLogic Adapter for HL7 uses schemas and system or user lookup files to transform and validate the BEA WebLogic Adapter for HL7 documents. Lookup files are used to apply system or HL7 mandated lookup tables (LOINC codes). The user lookup files have user mandated lookup information. These are in XML format and are maintainable by the user.

CHAPTER

2 Metadata, Schemas, and Repositories

This section explains how metadata for your enterprise information system (EIS) is described, how to name a schema repository and the schema manifest, how to create a schema, and how to store directory and template files for transformations. After the metadata for your EIS is described, you can create and deploy application views using the WebLogic Application View Console.

This section includes the following topics:

Understanding Metadata

When you define an application view, you are creating an XML-based interface between WebLogic Integration and an enterprise information system (EIS) or application within your enterprise. The BEA WebLogic Adapter for HL7 is used to define a file based interface to applications within and outside of the enterprise. Many applications or information systems use file systems to store and share data. These files contain information required by other applications, and this information can be fed information via the BEA WebLogic Adapter for HL7.

The BEA WebLogic Adapter for HL7 can exploit multiple protocols to receive or emit HL7 messages. The adapter facilitates conversion to and from XML. XML can be used within a WebLogic Integration in business process workflow. WebLogic Integration requires that XML versions of HL7 documents match schemas (provided) so that mapping for events or services can be enabled.

Events and services use this information to validate the documents (either post-HL7 to XML transformation or pre-XML to HL7 transformation). The reference for an event or service, to a schema or set of schemas, is provided in the manifest.xml file.

The schemaref tag indicates a schema instance and includes the name to select from the schema drop-down list in the event and service JSP console. The request and response tags relate to a service. A request tag represents the XML being sent to the service. A response tag represents the response XML document received from the service request. Event relates to the schema for the incoming document (after conversion) to the event listener.

Schemas and the related manifest are stored in a folder or directory in the local file system referred to as the EIS repository. The repository location is required when creating an application view from which events and services are configured. The EIS is set up automatically (and is populated with the required schemas and manifest) when an application view is defined.

Events are triggers to workflows. When a particular file arrives at a location, an event can be triggered to read and convert, if necessary, to the XML format that conforms to a particular schema, which then initiates a flow. Services are called from the workflow to perform supported operations.

Schemas and Repositories

You describe all the documents entering and exiting your WebLogic Integration system using W3C XML schemas. These schemas describe each event arriving to and propagating out of an event, and each request sent to and each response received from a service. There is one schema for each event and two for each service (one for the request, one for the response). The schemas are usually stored in files with an `.xsd` extension.

Use the WebLogic Integration Application View Console to access events and services, and to assign a schema to each event, request, and response. Assign each application view to a schema repository; several application views can be assigned to the same repository.

BEA WebLogic Adapters all make use of a schema repository to store their schema information and present it to the WebLogic Application View Console. The schema repository is a directory containing:

- A manifest file that describes the event and service schemas.
- The corresponding schema descriptions.

The Repository Manifest

Each schema repository has a manifest that describes the repository and its schemas. This repository manifest is stored as an XML file named `manifest.xml`.

The following is an example of a sample manifest file showing relationships between events and services and their related schemas.

The manifest file relates documents (through their schemas) to services and events. The manifest exposes schema references to the event relating the required document (via the root tag) to the corresponding schema. Schemas and manifests are stored in the same directory, the repository root of the EIS. The following is an example of the a manifest file with a description of the elements.

Listing 2-1 Sample Manifest File

```
<manifest>
       <connection/>
       <schemaref name="HL7_SCHEMA">
              <request root="HL7" file="oru_r01_v23.xsd"/>
              <response root="HL7" file="oru_r01_v23.xsd"/>
              <event root="HL7" file="oru_r01_v23.xsd"/>
       </schemaref>
```

The manifest has a schema reference section, named schemaref. The schema reference name is displayed in the schema drop-down list in the Add Service and Add Event windows in the WebLogic Integration Application View Console. This sample manifest has three schema references or schemaref tags; one for services only, one for events only, and one for a combination of services and events.

Events require only one schema, defined by the event tag. This relates the root tag of an XML document to a schema in the EIS repository. For services, two schemas are required: one for the document being passed to the service, represented by the request tag, and one for the expected response document received from the service operation, represented by the response tag.

Message Schemas, Rules, and Code Sets

The BEA WebLogic Adapter for HL7 supports the exchange of XML and non-XML messages with WebLogic Integration. In addition to converting/creating the HL7 documents, the BEA WebLogic Adapter for HL7 validates the structure and content.

To enable this type of conversion and validation, message schemas, rules files, and code sets (for lookups) are placed in the EIS repository that is created when creating an application view. The root for the EIS is based on your version of HL7 (version 2.3, version 2.3.1, or version 2.4).

Dictionaries, stored in the <EIS_Root>/version x.x.x/dictionaries directory, describe the HL7 messages. Rules files, stored in the <EIS_Root>/version x.x.x/rules directory, initiate validation by applying rules to the data via xpath reference to specific tags. Standard rules are supplied to check format (to validate data types) and check data against code set files stored in the <EIS_Root>/version x.x.x/rules/code sets directory. When an application view is created, the directory structures are created, and the required metadata are stored in the directories.

Samples File

Supplied with the BEA WebLogic Adapter for HL7 are sample files (xml and edi format) that can be used to help test that your environment is functioning correctly.

3 Defining an Application View for the BEA WebLogic Adapter for HL7

This section describes how application views are created. It includes the following topic:

The EIS Repository

When you create an application view, you define a repository of information that is referenced as metadata in the HL7 service and event adapters. A manifest file, schemas, rules files, and code set/lookup files) are placed in the EIS (Enterprise Information System).

When you create an application view, the system prompts you for an EIS root directory. After you establish the directory, you can view a drop-down list of the three supported versions of HL7 (version 2.3, 2.3.1, and 2.4). After you select the version, the adapter creates a directory structure starting at the EIS root as follows:

`<EIS_ROOT>\HL7\version x.x.x` (`x.x.x` represents the version number from the drop-down list). This is the root directory. The manifest.xml and the schemas are copied into this directory. Three other subdirectories also are created to store metadata required for the BEA WebLogic Adapter for HL7:

- `<EIS_ROOT>\HL7\version x.x.x\dictionaries`
  This is the directory where the data dictionaries are stored. The dictionaries are used to define the format of the HL7 message.
- `<EIS_ROOT>\HL7\version x.x.x\rules`
  The rules files for each document are stored in this directory.
- `<EIS_ROOT>\HL7\version x.x.x\rules\codeset - HL7Lookup`
  Standard HL7 validations are stored in this directory.

No intervention is required unless dictionaries must change (for example, when defining a new segment).

Creating a New Application View

1. Open the Application View Console, which is found at the following location:

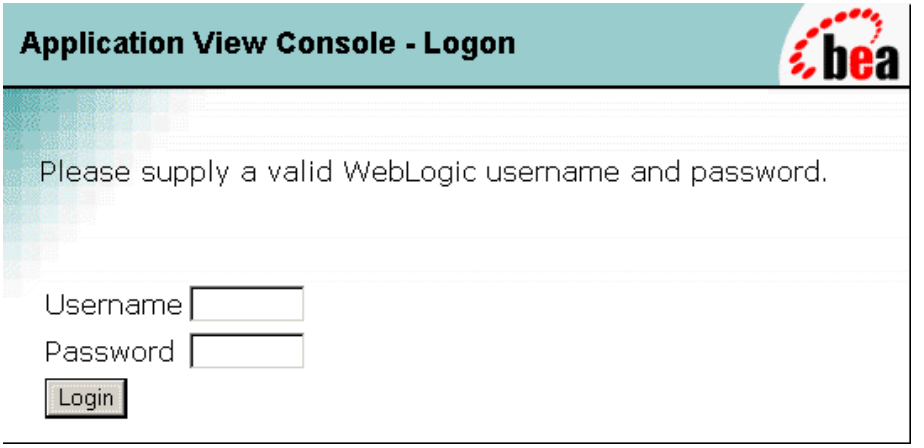
   `http://host:port/wlai`

   Here, *host* is the TCP/IP address or DNS name where WebLogic Integration Server is installed, and *port* is the socket on which the server is listening. The default port at the time of installation is 7001.

   For more information, see "Logging On to the WebLogic Integration Application View Console" in "Defining an Application View" in *Using Application Integration*:

   - For WebLogic Integration 7.0, see `http://edocs.bea.com/wli/docs70/aiuser/2usrdef.htm`
   - For WebLogic Integration 2.1, see `http://edocs.bea.com/wlintegration/v2_1sp/aiuser/2usrdef.htm`

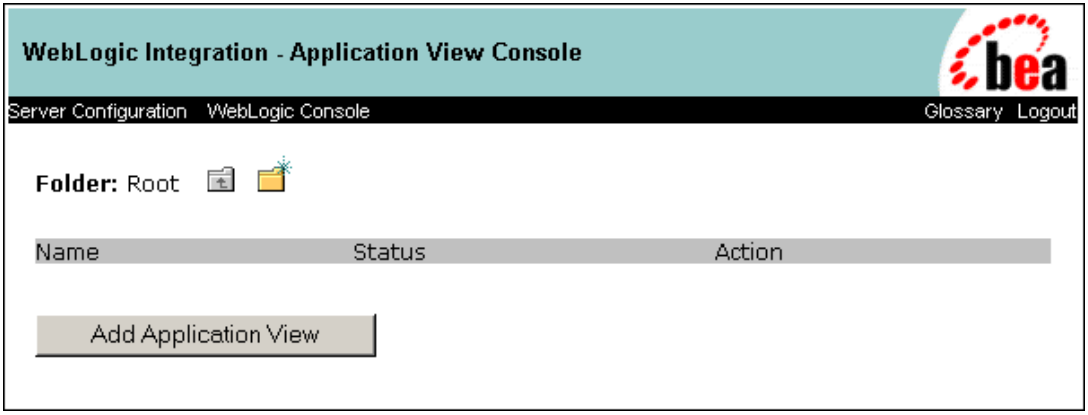
Figure 3-1 Application View Console - Logon



2. Enter a user name and password and click Login. The Application View Console opens.

   Note: If the user name is not `system`, it must be included in the `adapter` group. For more information on adding the administrative server user name to the `adapter` group, see the *BEA WebLogic Adapter for HL7 Installation and Configuration Guide*.

Figure 3-2 Application View Console Window



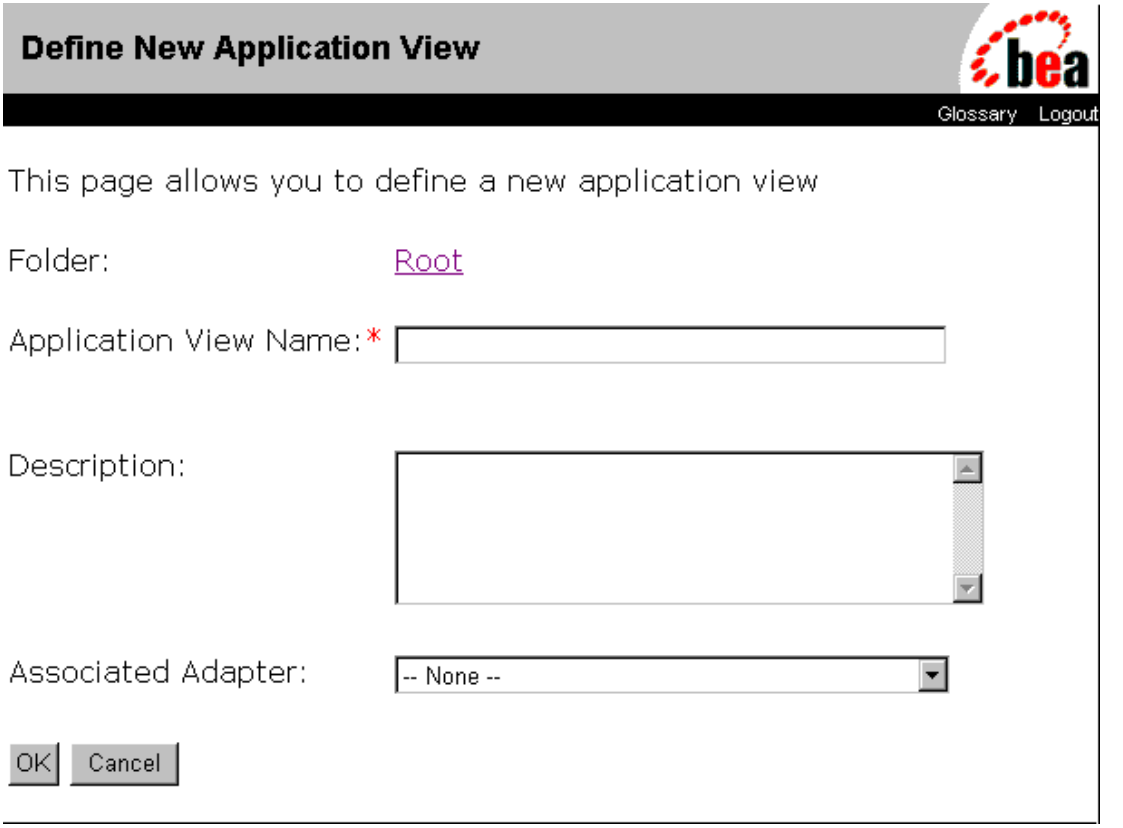
3. Click Add Application View to create a new application view for the appropriate adapter.

   An application view enables a set of business processes for this adapter's target EIS application. For more information, see "Defining an Application View" in *Using Application Integration*:

   - For WebLogic Integration 7.0, see `http://edocs.bea.com/wli/docs70/aiuser/2usrdef.htm`
   - For WebLogic Integration 2.1, see `http://edocs.bea.com/wlintegration/v2_1sp/aiuser/2usrdef.htm`

   The Define New Application View dialog box opens.

Figure 3-3 Define New Application View Window



4. In the Application View Name field, enter a name.

   The name should describe the set of functions performed by this application.

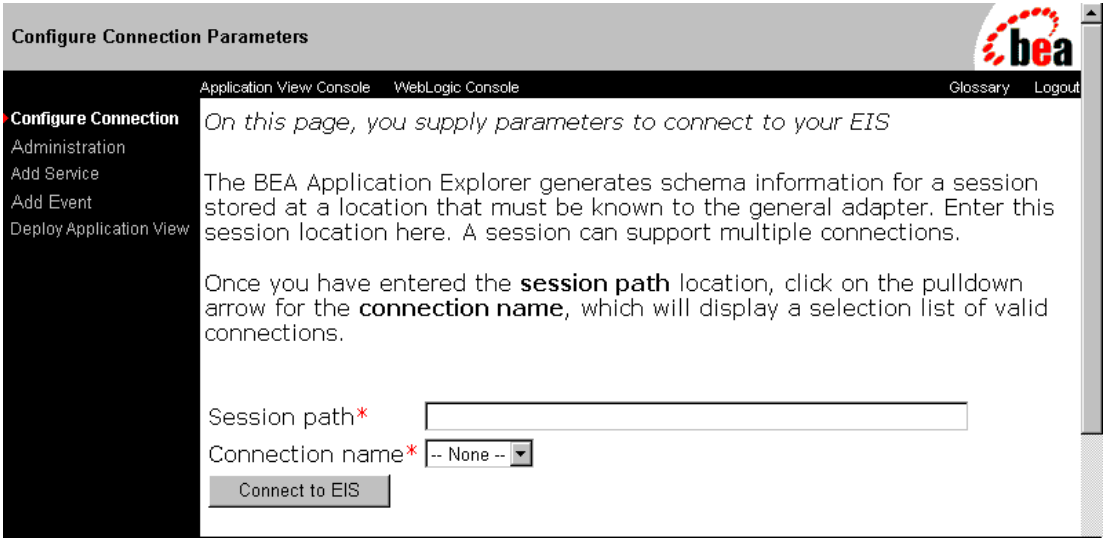
   Each application view name must be unique to its adapter. Valid characters are a-z, A-Z, 0-9, and _ (underscore).

5. In the Description field, enter any relevant notes. These notes are viewed by users when they use this application view in workflows using business process management.

6. From the Associated Adapter list, select the BEA_HL7_1_0 Adapter to use for creating this application view.

7. Click OK. The Configure Connection Parameters page opens.

Figure 3-4 Configure Connection Parameters Window

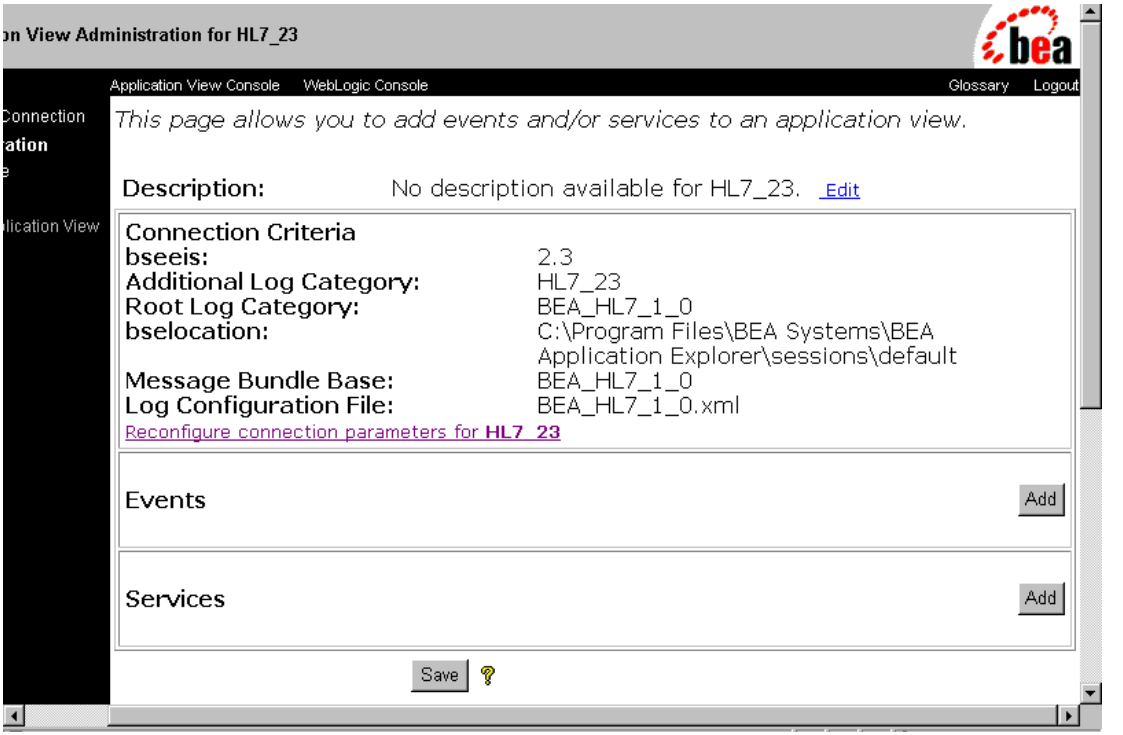


The metadata for the HL7 EIS is contained in the manifest.xml and schemas provided with this product and are placed in the EIS directory. See "The EIS Repository" on page 3-2.

8. Enter the root and select the connection name (the application folder containing schemas and the manifest file) from the drop-down list.

9. Click Connect to EIS to view the Application View Administration window.

Figure 3-5 Application View Administration Window



4 Service and Event Configuration

This section describes the configuration of services and events and shows the setting options available for enabling the EIS. It includes the following topics:

- Adding a Service to an Application View
- Adding an Event to an Application View
- Deploying an Application View
- Testing Services and Events

After the EAR file, metadata repository, and application views are defined and available to WebLogic Integration, services and events can be added to the newly created application view.

For information about the EAR file, see "Installing the BEA WebLogic Adapter for HL7" in the *BEA WebLogic Adapter for HL7 Installation and Configuration Guide.*

For information about establishing your EIS repository, see "Installing the BEA WebLogic Adapter for HL7" in the *BEA WebLogic Adapter for HL7 Installation and Configuration Guide.*

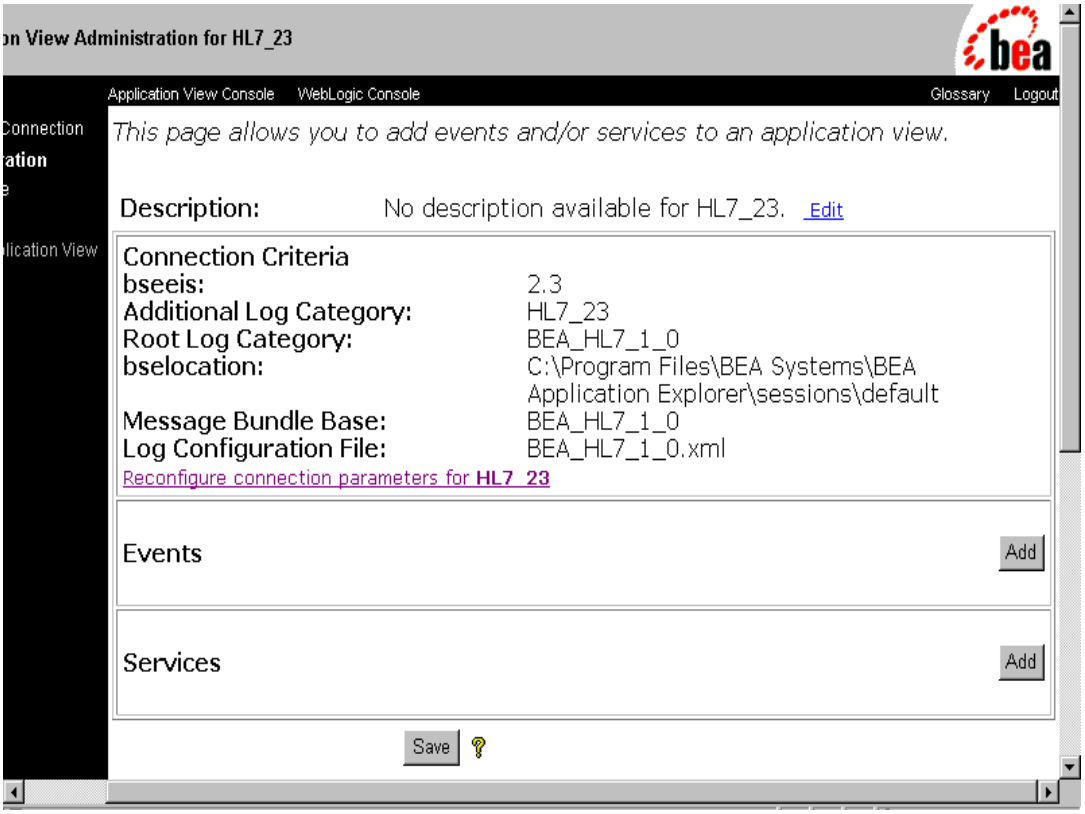
For information about defining application views, see Chapter 3, "Defining an Application View for the BEA WebLogic Adapter for HL7."

Adding a Service to an Application View

After you create and configure an application view, you can add services that support the application's functions.

1. While the application view is open (and undeployed), click Administration from the Configure Connection list in the left pane. The Application View Administration window opens.

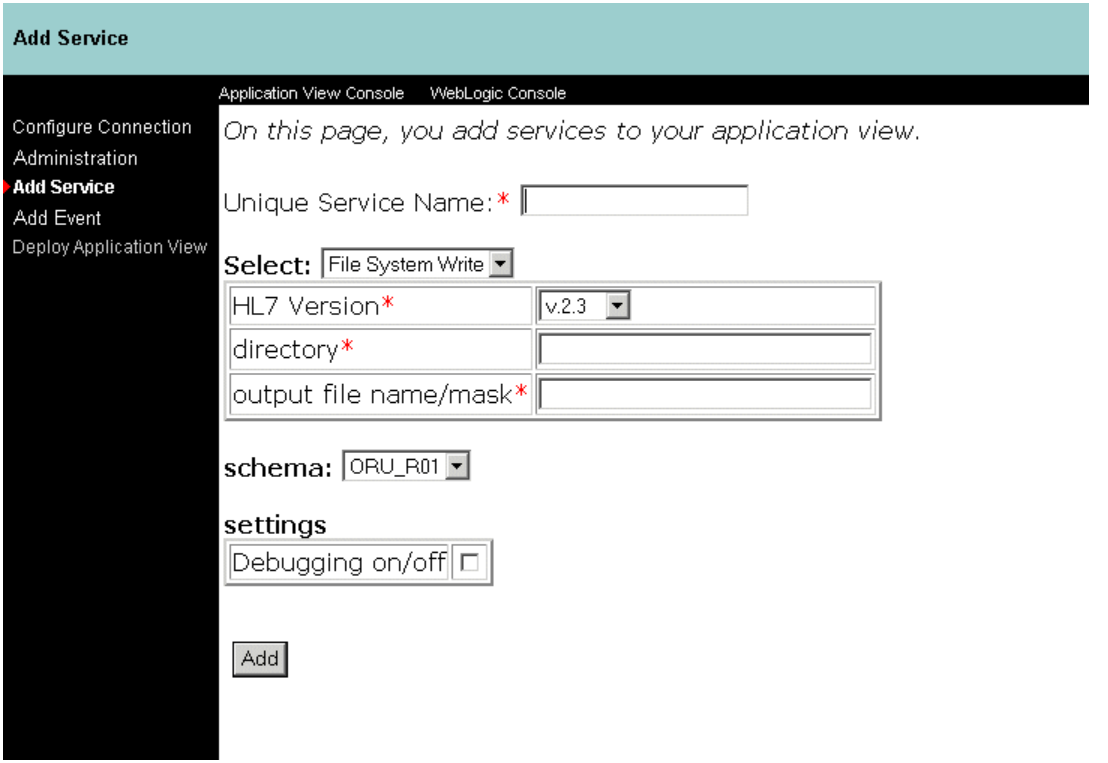
Figure 4-1 Application View Administration Window



2. Click Add in the Services pane.

The Add Service page opens.

Figure 4-2 Add Service Window



3. In the Unique Service Name field, enter a name.

   The name should describe the function performed by this service.

   Each service name must be unique to its application view. Valid characters are a-z, A-Z, 0-9, and _ (underscore).

4. Select the operation to be configured from the Select drop-down list. This list includes: File System Write, FTP Write, MQ Series, TCP, and HTTP. You can configure only one operation per service.

5. Enter the required values (required fields are marked with an asterisk). Descriptions of the parameters for each operation are provided in the following tables:

Table 4-1 File System Write

Setting	Meaning/Properties
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.
Directory* (*Required)	**Type/Value:** Directory path **Description:** Directory to which output messages are emitted.
Output file name/mask* (*Required)	**Type/Value:** String **Description:** The output file name (can contain a '*') that expands to a timestamp. A pound symbol can be used as a mask for a sequence count. Each pound symbol represents a whole number integer value. For example, File## counts up to 99 before restarting at 0, File### counts up to 999 before restarting at 0, and so on.

Table 4-2 FTP Write

Setting	Meaning/Properties
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.
Host name* (*Required)	**Type/Value:** String **Description:** FTP target system.
Port number	**Type/Value:** Numeric **Description:** FTP target system port (leave empty for FTP default).
User ID* (*Required)	**Type/Value:** String **Description:** User account ID to use when connecting to protocol host.
Password* (*Required)	**Type/Value:** String **Description:** Password for user account to use when connecting to protocol host.
Destination* (*Required)	**Type/Value:** String **Description:** Directory to address on FTP target system.
Output file name/mask	**Type/Value:** String **Description:** The output file name (can contain a '*') that expands to a timestamp.

Table 4-2 FTP Write (Continued)

Setting	Meaning/Properties
Retry interval	**Type/Sample Value:** Duration - xxH:xxM:xxS / 1H:2M:3S = 1 hour, 2 minutes, 3 seconds) **Description:** The maximum wait interval between retries when a connection fails.
Maxtries	**Type/Value:** String **Description:** Number of retries for a failed attempt to write.

Table 4-3 MQ Series

Setting	Meaning/Properties
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.
Queue manager* (*Required)	**Type/Sample Value:** String / QM_BEA_HL7 **Description:** Name of the MQSeries Queue Manager to be used.
Queue name* (*Required)	**Type/Sample Value:** String / TEST.iO **Description:** Queue on which request documents are received.
MQ client host	**Type/Value:** String **Description:** For MQ Client only. Host on which MQ Server is located.
MQ client port	**Type/Value:** Integer **Description:** For MQ Client only. Port number to connect to an MQ Server.
MQ client channel	**Type/Value:** String **Description:** For MQ Client only. Channel between an MQ Client and MQ Server.
Correlation ID	**Type/Value:** String **Description:** User definable correlation ID.

Table 4-4 TCP

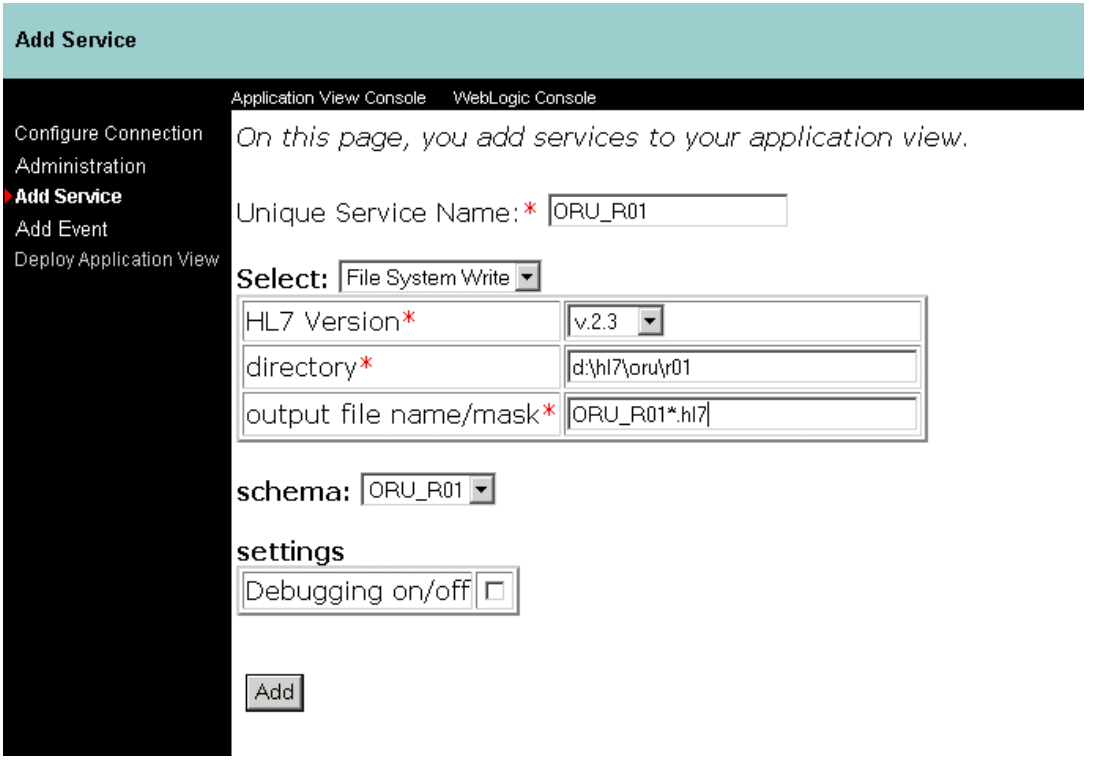
Setting	Meaning/Properties
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.
TCP port* (*Required)	**Type/Sample Value:** Integer / 12345 **Description:** TCP port
TCP host* (*Required)	**Type/Sample Value:** String / DNSNAME or 123.12.23.345 **Description:** Host name or host address of client restricted to accessing this event adapter.
Character set encoding* (*Required)	**Type/Sample Value:** String / ISO-8859-1 **Description:** Document character set.

Table 4-5 HTTP

Setting	Meaning/Properties
HL7 version* (*Required)	**Type/Value:** String **Description:** Version of HL7 messages passed to this protocol.
URL* (*Required)	**Type/Value:** HTTP compliant URL **Description:** URL where the HTTP emitter operation will post the answer set.
header_name=header_value	**Type/Value:** Expression **Description:** 10 optional headers and values can be passed in the post operation. Use headername=headervalue format.

The following figure shows the configuration of a File System Write operation:

Figure 4-3 Add Service



6. Select the schema required for this service. The schema drop-down has a selection for each HL7 document.
7. Set the debugging option.
8. Click Add.

   At this point, the application view can be deployed or more services or events can be configured.

   After the application view has been deployed, you can test the service. To deploy the application view, see "Deploying an Application View" on page 4-16.

Adding an Event to an Application View

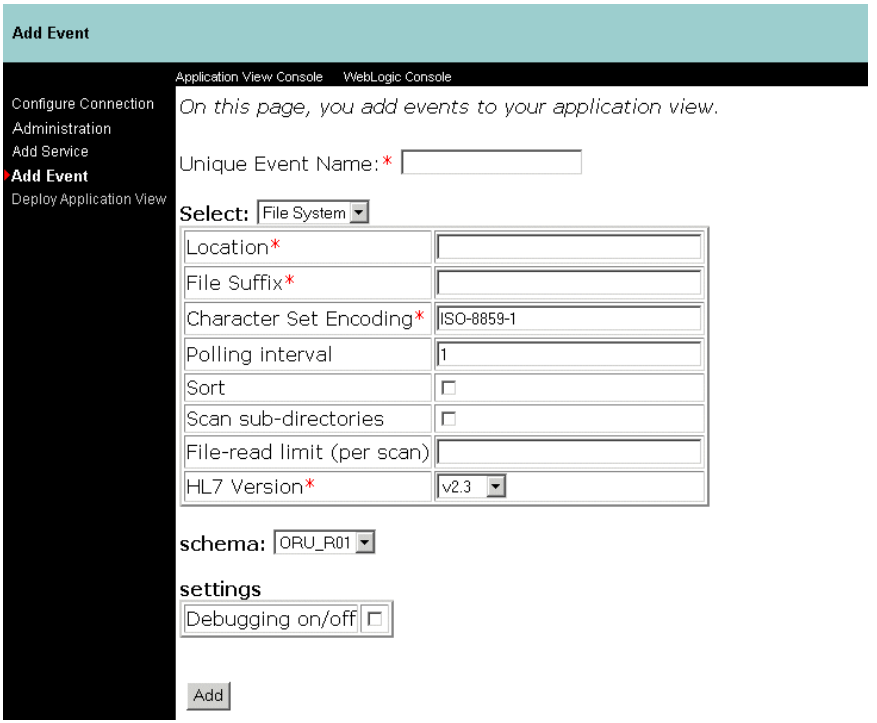
To add events to the application view, schemas must be present and mapped to the BEA WebLogic Adapter for HL7 EIS that is configured for the application view. For more information on creating an application view, see Chapter 3, "Defining an Application View for the BEA WebLogic Adapter for HL7."

If your application view is deployed, you must undeploy it and then edit the application view.

1. From the Application View Administration window, select Add in the Events section of the Application View Administration window.

   The Add Event window opens.

Figure 4-4 Add Event Window



2. Select a Unique Event Name from the Select drop-down list. You have the option to configure an event based on one of six protocols.
3. Select the event protocol required from the Select drop-down box.

   You have the option to configure an event based on one of the following protocols: File System, FTP, MQ Series, TCP, and HTTP.
4. Enter the required values (required fields are marked with an asterisk). Descriptions of the parameters are provided in the following tables:

Table 4-6 File System

Setting	Meaning/Properties
Location* (*Required)	**Type/Value:** Directory path **Description:** Directory in which input messages are received. The listener allows DOS-style file patterns for input selection. The file input section of the configuration is now a file pattern in addition to directory. The user can enter a pattern as c:\xyz\ab*cd, *without* the suffix, which is handled by the suffix list entry. See the following setting, File suffix. If a pattern is used, the files are selected based on order in the suffix and then the pattern. AB?CD selects ABxCD. AB*CD selects ABxxxCD.
File suffix* (*Required)	**Type/Value:** String **Description:** Limits input files to those with these extensions (separated by a comma). The "." is not required. The minus sign ("-") indicates that there is no extension. **Note:** If the file suffix is zip, the unzipped files must conform to the event schema, or they will fail. This function also works with transform configured.
Character set encoding* (*Required)	**Type/Value:** String **Description:** Sets the character set encoding to be used (default value ISO-8859-1-US and Western Europe).
Polling interval	**Type/Sample Value:** Duration - xxH:xxM:xxS / 1H:2M:3S = (1 hour, 2 minutes, 3 seconds) **Description:** The maximum wait interval between checks for new documents. The higher this value, the longer the interval, and the fewer system resources that are used. The side effect of a high value is that the worker thread cannot respond to a stop command. If timeout is set to 0, the listener runs once and terminates. Default is 2 seconds.

Table 4-6 File System (Continued)

Setting	Meaning/Properties
Sort	**Type/Value:** Boolean (true or false) **Description:** Sort by arrival. If set, sort incoming documents by arrival time. Maintains sequence, but slows performance.
Scan sub-directories	**Type/Value:** Boolean (true or false) **Description:** Scans all subdirectories for documents to be processed.
File-read limit	**Type/Value:** Integer **Description:** The number of files read per sweep of the File directory location.
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.

Table 4-7 FTP

Setting	Meaning/Properties
User ID* (*Required)	**Type/Value:** String **Description:** User account to use when connecting to protocol host.
Password* (*Required)	**Type/Value:** String **Description:** Password for user account to use when connecting to protocol host.
Host name* (*Required)	**Type/Value:** String **Description:** Name of host machine where the listener contacts service to obtain requests.
Location* (*Required)	**Type/Value:** Directory **Description:** Directory on FTP host to retrieve files from.You must append the file suffix (extension) to the file or files specified in the Location field. For example, you can enter a specific file such as `/path/to/my/ftp/directory/myfile.xml` or a group of files such as `/path/to/my/ftp/directory/*.zip`.
File suffix	**Type/Value:** String **Description:** This field is no longer used. You must append the file suffix to the file or files specified in the Location field.

Table 4-7 FTP (Continued)

Setting	Meaning/Properties
Character set encoding* (*Required)	**Type/Value:** String **Description:** Sets the character set encoding to be used (default value ISO-8859-1 -US and Western Europe).
Polling interval	**Type/SampleValue:** Duration - xxH:xxM:xxS (1H:2M:3S = 1 hour, 2 minutes, 3 seconds) **Description:** The maximum wait interval between checks for new documents. The higher this value, the longer the interval, and the fewer system resources that are used. The side effect of a high value is that the worker thread cannot respond to a stop command. If timeout is set to 0, the listener runs once and terminates. Default is 2 seconds.
Scan sub-directories	**Type/Value:** Boolean (true or false) **Description:** Scans all subdirectories for documents to be processed.
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.

Table 4-8 MQ Series

Setting	Meaning/Properties
Queue manager* (*Required)	**Type/Sample Value:** String / QM_BEA_HL7 **Description:** Name of the MQSeries queue manager to be used.
Queue name* (*Required)	**Type/Sample Value:** String /TEST.iO **Description:** Queue on which request documents are received.
MQ client host	**Type/Sample Value:** String **Description:** For MQ client only. Host on which MQ Server is located.
MQ client port	**Type/Value:** Integer **Description:** For MQ client only. Port number to connect to an MQ server.
MQ client channel	**Type/Value:** String **Description:** For MQ client only. Channel between an MQ client and MQ server.

Table 4-8 MQ Series (Continued)

Setting	Meaning/Properties
Polling interval	**Type/Sample Value:** String duration in the format *nn*H:*nn*M:*nn*S / 1H:2M:3S (1 hour, 2 minutes, 3 seconds) **Description:** The maximum wait interval between checks for new documents. The higher this value, the longer the interval, and the fewer system resources that are used. The side effect of a high value is that the worker thread cannot respond to a stop command. If timeout is set to 0, the listener runs once and terminates. Default is 2 seconds.
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.

Table 4-9 TCP

Setting	Meaning/Properties
TCP port* (*Required)	**Type/Sample Value:** Integer / 12345 **Description:** TCP listening port.
Allowable client host	**Type/Sample Value:** String / DNSNAME *or* 123.12.23.345 **Description:** Host name or host address of client restricted to accessing this event adapter.
HL7 version	**Type/Sample Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.
Character set encoding* (*Required)	**Type/Sample Value:** String / ISO-8859-1 **Description:** Document character set.

Table 4-10 HTTP

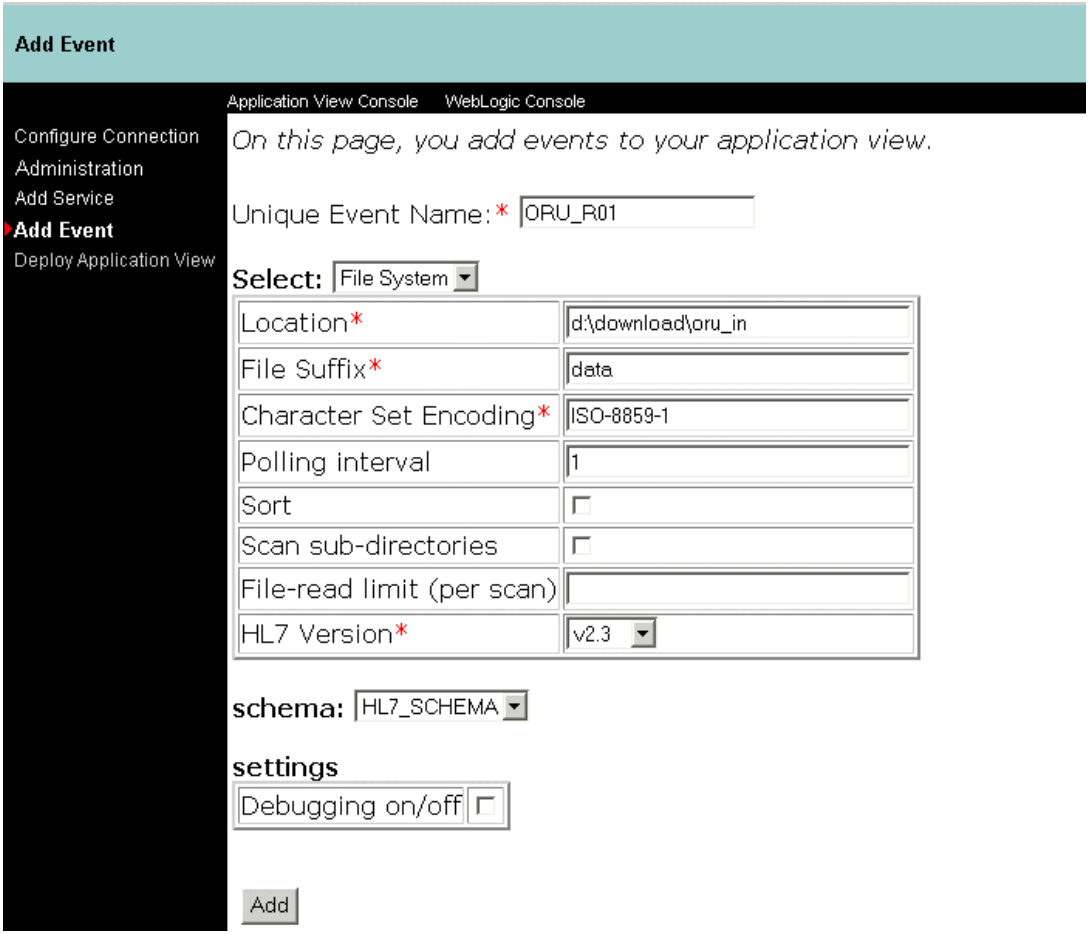
Setting	Meaning/Properties
Character set encoding* (*Required)	**Type/Sample Value:** String / ISO-8859-1 **Description:** Document character set.

Table 4-10 HTTP (Continued)

Setting	Meaning/Properties
Port* (*Required)	**Type/Sample Value:** Integer / 12345 **Description:** HTTP listener port.
HL7 version	**Type/Value:** Drop-down list **Description:** Version of HL7 messages passed to this protocol.

The following figure provides an example of a configured File System event.

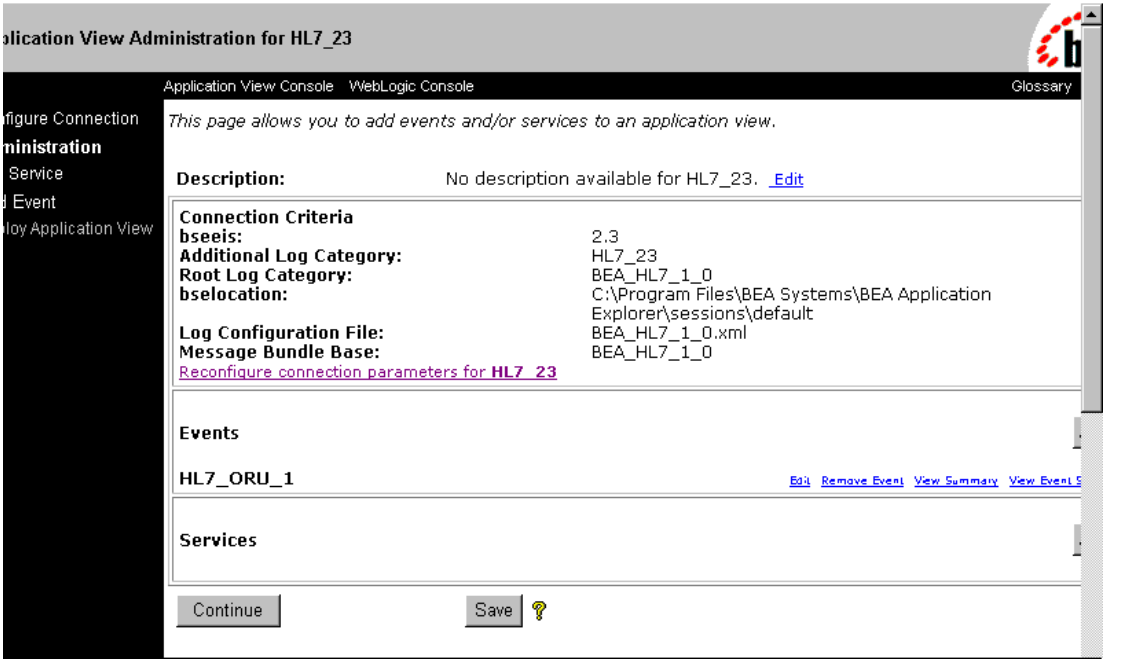
Figure 4-5 Add Event Window



5. Select the schema required for this event.The schema drop-down box contains a selection for each HL7 document.
6. Set the debugging option.
7. Click Add.

   The Application View Administration window opens:

Figure 4-6 Application View Administration Window



8. Click Save to save your settings.

You can deploy your application view (complete with configured events and/or services) by following the steps described in "Deploying an Application View" on page 4-16. Then, test your application view by following the steps described in Chapter 5, "BEA WebLogic Adapter for HL7 Integration Using Business Process Management.".

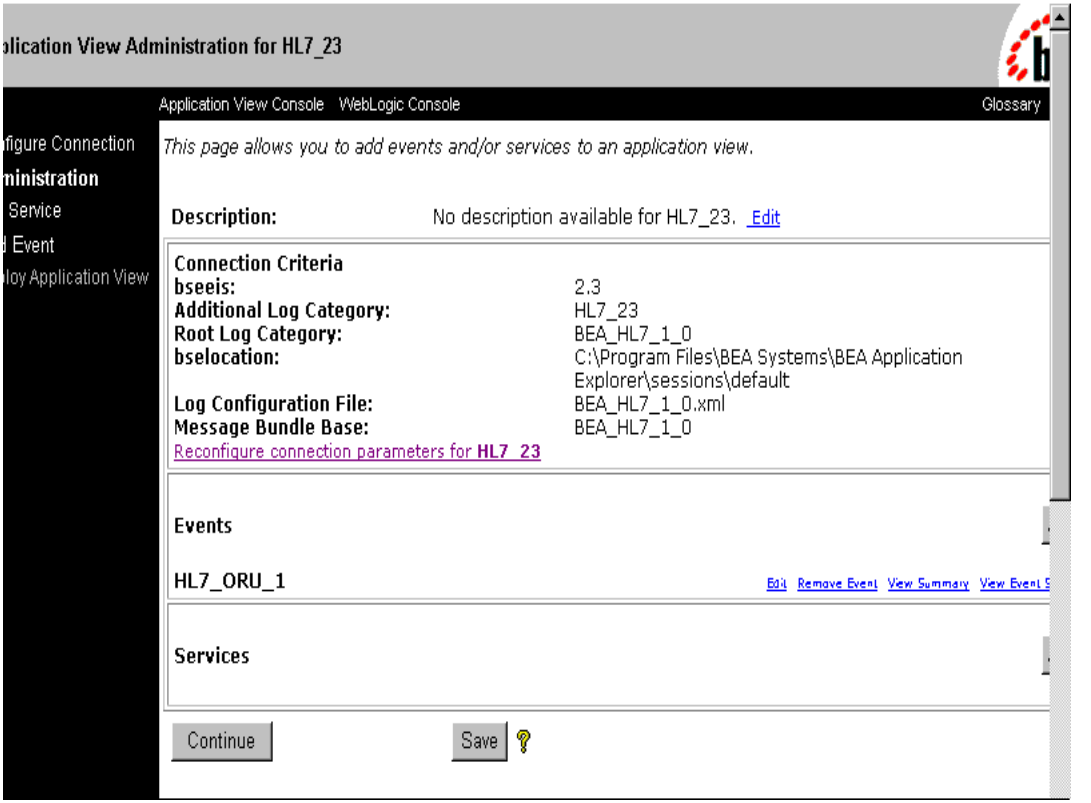
Deploying an Application View

You can deploy an application view when you have added at least one event or service to it. You must deploy an application view before you can test its services and events or use the application view in the WebLogic Server environment.

Application view deployment places relevant metadata about its services and events into a run-time metadata repository. Deployment makes the application view available to other WebLogic Server clients. This means that business processes can interact with the application view, and you can test the application view's services and events.

After you configure an event or schema, you can deploy your application view from the Application View Administration window.

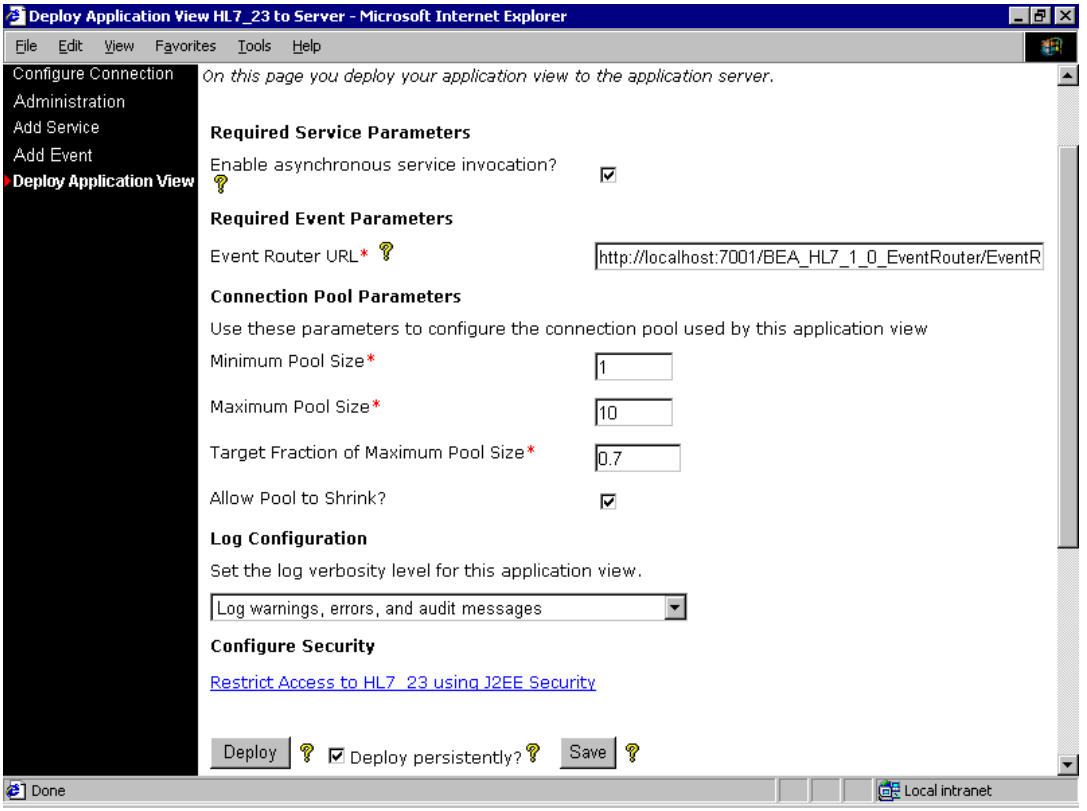
Figure 4-7 Application View Administration Window



1. From the Application View Administration window, click Continue.

   The Deploy Application View window opens.

Figure 4-8 Deploy Application View Window



Note: To enable business process management functionality to allow other authorized clients to call the services (if any) of this application view asynchronously, select Enable Asynchronous Service Invocation.

2. To deploy the application view, click Deploy.

   The Summary for Application View page opens.

   Note: You may choose to click Save and deploy the BEA WebLogic Adapter for HL7 later.

After you create and deploy an application view, test the service and events. For more information, see "Testing Services and Events".

Testing Services and Events

You can test services and events after you create and deploy an application view.

To test a service:

1. In the Summary for Application View window, click Test for the configured service.
2. The Test window opens, prompting you for test XML code.
3. Enter the required XML by cutting and pasting. You can use the sample Headers.xml supplied with the product.
4. Click Test.

   If your service has been configured correctly, you receive a response from the file emit process with a status code of "0."

   In addition, you find that the file has been written to the correct location.

After you confirm that the file has been written and formatted correctly (if transformation has been configured), your service adapter has been configured successfully.

You can now write custom code or create a process flow in business process management. For more information, see "Using Application Views in the Studio" in *Using Application Integration*:

- For WebLogic Integration 7.0, see `http://edocs.bea.com/wli/docs70/aiuser/3usruse.htm`
- For WebLogic Integration 2.1, see `http://edocs.bea.com/wlintegration/v2_1sp/aiuser/3usruse.htm`

To test an event:

1. After you configure your event, place an HL7 document in the place holder (that is, the protocol) defined at event configuration.
2. Test the event using a workflow (that is, a workflow triggered by an event). For more information, see Chapter 5, "BEA WebLogic Adapter for HL7 Integration Using Business Process Management."

5 BEA WebLogic Adapter for HL7 Integration Using Business Process Management

This section describes how to use the BEA WebLogic Adapter for HL7 to integrate business processes management. It includes the following topic:

Business Process Management

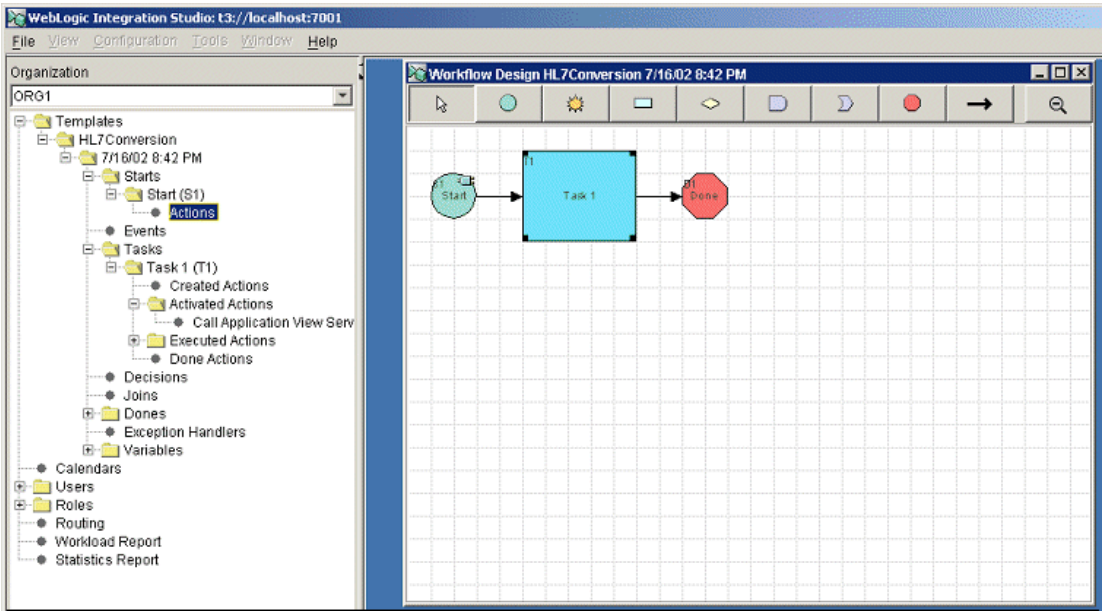
After successfully creating your application view, including services and events, you can integrate it into the business process management workflow.

The following graphic depicts a simple workflow design triggered by an event described in Chapter 4, “Service and Event Configuration.”

The incoming event converts a document and utilizes a service adapter to propagate the event to a file system. For example, an HL7 ORU/R01(Observational Report) file is converted to XML. The XML version of the ORU/R01 document is routed (using the Event router) to the business process management workflow for processing. The data from the report could be used to update a repository of disease statistics for monitoring the spread of infections. Alternatively, the service adapter can initiate the creation of an HL7 document. Information about the admission of a patient to a hospital can be shared with other HL7-enabled applications that require the patient information.

The following example shows how an event can trigger information propagation of HL7 data in the environment.

Figure 5-1 Workflow Design



The following document is an example of an ORU/R01 document used in this process. HL7 samples are provided with a zip file called `BEA_HL7_INSTALL.ZIP` that is supplied with your installation package:

```
MSH|^~\&||MediLabCo-Seattle^45D0470381^CLIA|NPHSS|WA-DOH|19960217
1830||ORU^R01|MSG_CONTROL|P|2.4

PID||10543^^^^^Columbia Valley Memorial
Hospital&01D0355944&CLIA|95101100001^^^^^MediLabCo-
Seattle&45D0470381&CLIA||Doe^John^Q^Jr|Clemmons|19641004|M||2106-
3|2166 Wells Dr^Apt
B^Seattle^WA^98109^USA^^^King||^^^^^206^6793240|||M|||423523049|D
OEJ34556057^WA^19970801||N|||||||||||||||DA

OBR|||SER122145|78334^Hepatitis Panel,
Measurement^L|||199603210830|||||||BLDV|^Welby^M^J^Jr^Dr^MD|^^^^
^206^4884144|||||||F

OBX||CE|5182-1^Hepatitis A Virus, Serum Antibody
EIA^LN||G-A200^Positive^SNM||||||F|||199603241500|45D0480381
```

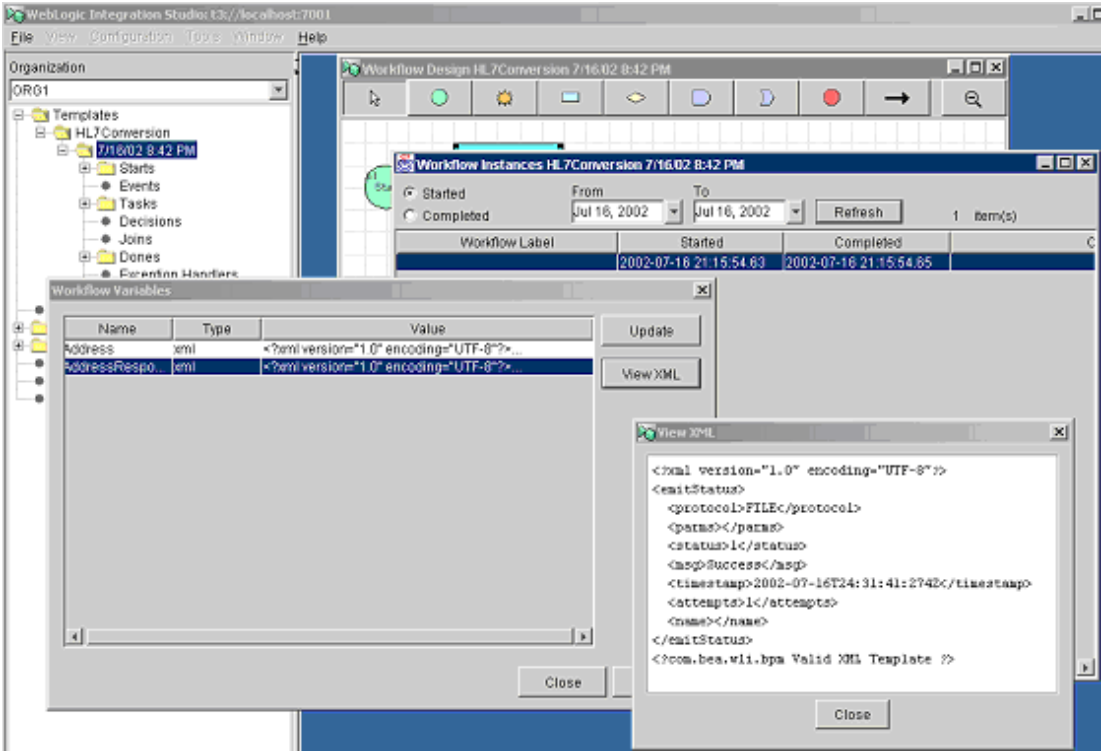
Starting with the original document, this process is as follows:

1. The document is placed into an FTP directory that has a BEA WebLogic Adapter for HL7 event configured to be triggered by the arrival of the ORU/R01 document. The event has been pre-configured to apply an EDI to XML conversion, using the event configuration JSP.

2. After the adapter completes the process, the workflow propagates the XML document onto the adapter service. The workflow is configured to process the information and create the XML document required for the XML to EDI (271) transformation and write to a local file system.

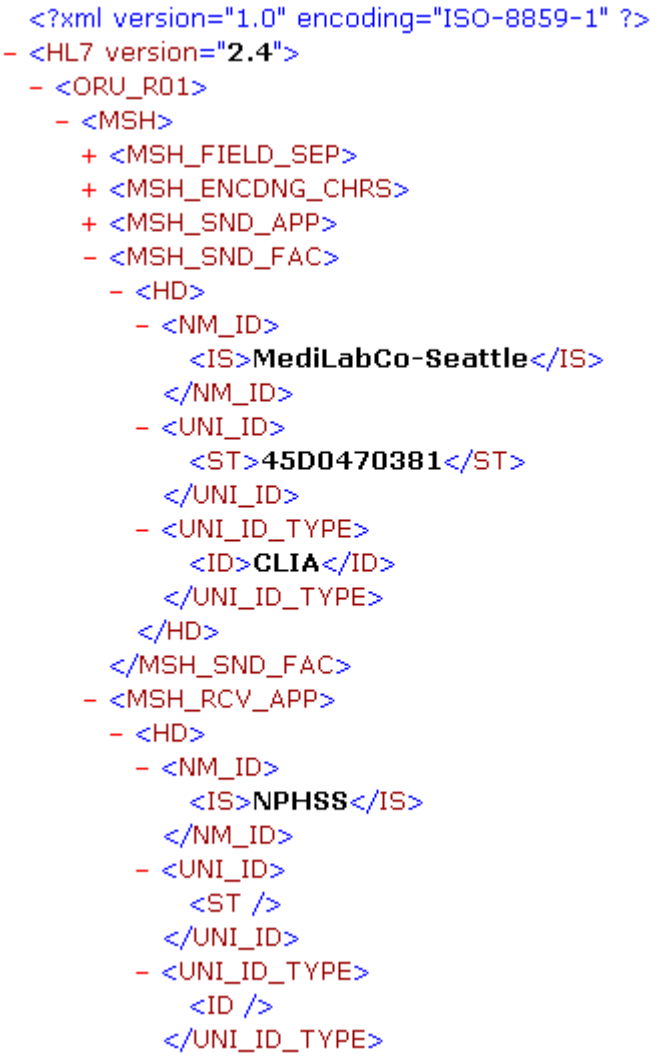
3. After the service has completed its task, the emission report is returned to the workflow. (See the following graphic.)

Figure 5-2 Emission Report



The following is an example of the XML ORU/R01document that was created and routed to the file system:

Figure 5-3 HL7 ORU/R01 XML



CHAPTER

6 Writing and Editing Rule Specification Files

This section explains how to write and edit rule specification files. It includes the following topics:

- Rule Specification File
- Built In HL7 Rules
- HL7 Rule Set
- Rules In Java
- Writing Rule Search Routines in Java

A complete set of validation rules is supplied with BEA format adapters, such as the BEA WebLogic Adapter for HL7. However, occasionally it may be necessary to edit the supplied Rule Specification files. Also, validation may be applied to another type of document by creating a new Rule Specification file for it. This section provides details on constructing or editing a Rule Specification file.

Rule Specification File

The Rule Specification file is an XML document. One file should exist for each document type to be validated, as defined by its XML root element. For clarity, the root element of the rules file should match the root element of the document being validated. Contained within root element are the individual rule elements.

A production Rule Specification likely has many <rule> elements, as many as are required to validate the entire document. Building a complete Rule Specification involves identifying each element to be validated and selecting the appropriate rule for the type of validation required. For example, the checkList rule validates that the element contains only values from the supplied list. There also is an isFDate rule that validates that the element value has the proper date format (CCYYMMDD).

Example: Creating a Simple Rule Specification File

The structure for a simple Rule Specification file could be as follows:

```
<TestDoc>
   <using class="XDHl7Rules">
       <rule tag="EL1"   method="checkList"   code="a,b,c"/>
      <rule tag="EL99"   method="isFDate"   code="RD8"/>
  </using>
</TestDoc>
```

Here:

`<TestDoc>`
: Represents the XML type of the document to be validated.

`<using class="XDHl7Rules">`
: Selects a global rule class to be used. This option also eliminates the need to specify the class on each individual <rule> element. In this case, the built-in HL7 rule set, XDHl7Rules, is to be used. You may also write your own custom rule set in a Java class and specify it here.

`<rule tag="EL1">`
: Indicates that a rule is to be applied to the segment or element called “EL1”.

`method="checkList"`
: Identifies the actual rule to be applied. (This is a method of the global class being used as specified above; in this case, "XDHl7Rules"). The checkList rule validates that an element contains only values from a defined list. There are many such built-in rules (see "Reference: Syntax for Writing Rules" on page 6-3).

`code="a,b,c"`
: Is a parameter that the rule uses. In this case, checkList would validate that the SEG1 element contains values from this list ("a,b,c"). Each rule has a different set of parameters (see "Reference: Syntax for Writing Rules" on page 6-3).

`<rule tag="EL99" method="isFDate" code="RD8"/>`
: Is a rule applied to an element named "EL99". The rule to be applied is isFDate, which verifies that the element value contains a date format. In this case, the code attribute specifies which date format the value should be.

Reference: Syntax for Writing Rules

The following table lists the general syntax for writing rules.

Table 6-1 Rules for Writing Syntax

Rule Element	Attribute	Description
<using>	class=	The Java program class containing all <rule>s within the section, unless overridden by a class= attribute in the <rule> entry itself.
<rule>	tag=	Names the right-most parts of the tag to which this rule applies. The rule applies to any node of the document that meets the tag criteria. For example, DTM causes this rule to be applied to every DTM in the incoming document. X.DTM applies to all DTM parts prefixed by X. Tags are case sensitive. If omitted, stag must be used.
<rule>	stag=	For HL7 documents, this is a specification subsection tag. For more information, see "Reference: Syntax for Writing Rules" on page 6-3.

Table 6-1 Rules for Writing Syntax (Continued)

Rule Element	Attribute	Description
<rule>	name=	The rule's identification; should be a unique name. This is used in trace messages to specify which rule caused a violation. If omitted, no unique identification can be given.
<rule>	class=	The rule class to which this rule belongs. This corresponds to a Java object class, and each rule is a method of the class. If this is omitted, the class from the enclosing USING tag is used.
<rule>	method=	The specific rule.
<rule>	usage=	Specify usage=M (mandatory) to indicate that there must be a value in the identified node. This check is applied before the actual rule logic is executed.

The rule *tag* and *method* attributes are required. The remaining attributes are rule-specific and their inclusion is based on the rule itself. The validation engine uses the required tags to identify the rule in question and to identify the node or nodes of the document to which it applies.

The rule document is located by the <validation> tag value in the dictionary's *system* section, and is identified with the specific document in its <document> entry.

Built In HL7 Rules

The Validation Engine provides a set of HL7 rules (class=XDHl7Rules) that can be used to validate most HL7 situations. These rules can be applied to any part of the incoming document. The rules use a standard set of attributes, as well as specialized attributes. Where the standard attributes are used, they are listed by name and not further described under each rule.

For HL7 documents, the *tag=* attribute used to position the rule has been joined by a *stag=* (specification tag) attribute. One or the other may be used. *Stag=* positions to a specification section at the appropriate subchild. For example, *stag=BPR04* applies the rule to the fourth child of every BPR in the document.

Either *tag=* or *stag=* specifications allow subsection specification by appending :<subsection> to the end of the tag. Subsections are base 1. For example, if the value of a field, ABC03 is HC:123:XY, to apply the isN rule to the 123 subsection, the address would be stag=ABC03:2. Regardless of the subfield separator character (specified in character 104 of the ISA segment), the colon is used in the addressing tag.

If/Then Date Format Rules

Some segments contain a triplet consisting of a subfield:

1. A code.
2. A date or time format such as RD8.
3. A date or time value encoded as per the designated format.

The allowed format depends on the code. To accommodate this, the code= attribute can be an if/ then set:

```
code="if/then, if/then….”
```

Here the if and then clauses allow several items, separated by a |. If the code is in the if list, the format must be in the then list. If the code is not in the if list, the rule steps to the next if list. For example:

```
code=”416|19/D8|RD8, 22/TM, 77/”
```

To omit the then clause, enter no information after the ‘/’. In the above example, this would signify that if the type is 77, then no date format or date is to be checked.

HL7 Rule Set

The following is a list of methods called by the rules engine to validate a document.

isN

isN validates that a node is numeric with an optional leading sign.

```
<rule tag="xx" method="isN" />
```

Table 6-2 isN

Attribute	Meaning
min	Minimum number of digits required, not including sign. Optional.
max	Maximum number of digits permitted, not including sign. Optional.

isR

isR validates that a node is numeric with an optional leading sign and a single decimal point.

```
<rule tag="xx" class="XDHl7Rules" method="isR" />
```

Table 6-3 isR

Attribute	Meaning
min	Minimum number of digits required, not including sign or radix. Optional.
max	Maximum number of digits permitted, not including sign or radix. Optional.

isDate

isDate validates that a node is a CCYYMMDD format.

```
<rule tag="xx" class="XDHl7Rules" method="isDate" />
```

Table 6-4 isR

Attribute	Meaning
min	Minimum number of positions required. If omitted, 8 is assumed.
max	Maximum positions permitted. If omitted, 8 is assumed.

isTime

isTime validates that a node is in HHMM[SS] format.

```
<rule tag="xx" method="isTime" />
```

Table 6-5 isTime

Attribute	Meaning
None	Not applicable.

isFDATE

isFDate validates that a node has a proper date qualifier format (such as RD8) based on the code list. If the qualifier is in the list, then the next field must be a date in the format as defined by the qualifier. If the date is null, then the rule is successful.

```
<rule stag=CR603  method="isFDate" code="RD8" />
```

This example checks that the date value in field CR604 is formatted as per CR603.

Table 6-6 isFDATE

Attribute	Meaning
code	List of valid qualifiers.

checkLen

checkLen validates that a node is of sufficient size (length). Note that many rules provide minimum and maximum checking. In such cases, do not use this rule, as it is not necessary.

```
<rule stag=HI03:3  method="checkLen" min="2" max="8" />
```

Table 6-7 checkLen

Attribute	Meaning
min	Minimum number of characters - Optional. If omitted, no check is performed.
max	Maximum number of characters - Optional. If omitted, no check is performed.

checkUsage

checkUsage validates the presence of segment elements or components according to a pattern. The patterns validate the code in the independent variable. The *tag=* or *stag=* attribute can be used to locate the section to which the rule applies. The *domain=* attribute specifies whether elements or components are to be tested.

```
<rule name="simpler" tag="NAM"  method="checkUsage"  code="1=BK / S2 + R3, 3 ! BR + 5=KK / N2 + S3"/>

<rule name="any" tag="NAM"  method="checkUsage"  code="1=?/ S2 + R3"/>

<rule name="complex" tag="QQ" method="checkUsage" code="2:3=CD + ((1=XX | 3=BP) | 1=AB)/R1 + (N3:1 | R:2)" />
```

In the “simpler” example, the value of the NAM element is under examination. If the value in child 1 contains BK, then check the usages of components 2 and 3. If the value in component 3 is NOT BR and the value in component 5 is KK, then component 2 must be null and component 3 may be null.

In the “any” example, 1=?/xxx means that if field 1 has any code but is not empty, then the remainder of the rule is evaluated.

The “complex” example demonstrates that nested logical conditions are allowed on either the if or the then side of the equation.

The values to be checked are expressed as <child>:<part> where either is optional. If <child> addressing is used, 03 in SVC, which is the third child of the SVC segment. Then, while a *stag* could address SVC03, the *tag* should be used to address the SVC directly.

Note that + is used for and to avoid the need to escape the & entity.

Table 6-8

Attribute	Meaning
Code	The if/then validation criteria in the form code := <item> [,<item>]* item := <if_exp>[+ | <if_exp>]*/<then_spec> [+ | <then_spec>]* if_exp := <position><op><value> then_spec := <action><position> position := child | :composite | child:composite child := integer composite := integer op := ! | =

<action> codes

R	A value in the field is required and must not be null.
N	The value in the field must be null, or the field must be missing.
S	The field may contain either a value or a null.

A <value> of ? in an if clause means that the then side applies regardless of the code value.

isCDate

isCDate validates that a node has a proper date qualifier format (such as RD8) based on the code list. If the qualifier is in the list, then the next field must be a date in the format as defined by the qualifier. This differs from isFDate() in that it uses portions of the value field of the node for data rather than following data fields.

```
<rule stag=CR603  method="isCDate" code="RD8"  format="3",
value="4"/>
```

Table 6-9 isCDate

Attribute	Meaning
code	List of valid qualifiers or if/then list if *type=* used.
format	Subfield number (base 1) containing the format position to be checked.
value	Subfield number (base 1) containing the date value to be checked.
type	Optional. If used, the code must be an if/then format (see "If/Then Date Format Rules" on page 6-6) rather than a simple list. The *type=* attribute identifies the piece (base 1) containing the qualifier to test against the if side of the if/then rule.

checkList

checkList validates that the content of a field is in the list. This must address a single field. The list may be explicitly defined or in a supplied file.

```
<rule tag="NM1. _01_Entity_Identifier_Code_"  method="checkList"
   code="BD,BS,FI,MC,PC,SL,UP,XX"/>

<rule tag="NM1. _01_Entity_Identifier_Code_"  method="checkList"
   code="@ZIPCODES"/>
```

Table 6-10 checkList

Attribute	Meaning
code	One of the following: 1. A list of comma separated codes. 2. The @ symbol to specify a file that contains the list. The name supplied is an alias that must be resolved in the Custom Dictionary <system><preload> section (see the following example). 3. The name of a code list search routine. Code list search routines are Java classes that extend XDRuleList().

Example: Resolving a Checklist File Alias In the Custom Dictionary

This is the syntax required when using the checkList function with a file.

```
<system>
  <preload>
   <name
file="XDRuleListFile(C:\\Hl7Codes\\ZipCodes.txt)">ZIPCODES</name>
  </preload>
<system>
```

The checkList supports a provided procedure named XDRuleListFile() that accepts a single parameter of the file name. The file must consist of a series of codes separated by blanks, commas, or new lines. For example, to use a rule that employs one of these built-in code lists, enter the procedure into the dictionary using the console, or add a <preload> entry to the <system> area of the dictionary. An example of how to accomplish this is given in "Writing Rule Search Routines in Java" on page 6-17.

checkEQ

checkEQ validates that if element a is present, element b must also be present and be equal to a. The elements a and b must be stags.

```
<rule tag="root"  method="checkEQ" a="BPR10" b="TRB03"/>
```

Table 6-11 checkEQ

Attribute	Meaning
a	Value that triggers the rule.
b	Value that must be equal to a if a is present and has a value.

segXO

segXO exclusive or segment a or b may be present, but not both.

```
<rule tag="root"  method="segXO" a="MIA" b="MOA"/>
```

Table 6-12 segXO

Attribute	Meaning
a	First value.
b	Second value.

Rules In Java

Rules can be written in Java, loaded by the system at startup, and applied by specification in a rule. A rule class extends XDRuleClass and can make use of any of its services. Each public method in the rule class that meets the rule signature can be applied by name as a rule. The rule methods can make use of service methods in the parental XDRuleClass.

In this example, a node is checked to determine whether its value is the word identified by the value= attribute. If it is not, an error has occurred.

On entry to the rule, the following parameters are passed:

Table 6-13 Rules in Java

Parameter	Description
`Node`	The node identified by the tag attribute in the rule. The rule method is called once for each node that matches the tag specification.
`Value`	The data value of the addressed node. This differs from the node.getValue() return if the tag contained a subfield address (for example, tag=x:2).
`Attributes`	A HashMap of rule attributes. The rule method can check for any attributes that it desires. A HashMap is a fast implementation of a Hashtable that does not serialize.

Example: Writing Rules in Java

This section describes how to write rules in Java for special situations.

```
import java.util.*;
import com.ibi.edaqm.*;
public class XDMyRules extends XDRuleClass
{
    public XDMyRules()
    {
    }
    public void specialRule(XDNode node, String value,
                        HashMap attributes)
                throws XDException
    {
        trace(XD.TRACE_DEBUG, "specialRule called with parms: " +
               node.getFullName() + ", " + attributes.toString());
         String testValue = (String)attributes.get("value");
         if (value.equals(testValue) )
         {
 node.setAssociatedVector(new XDEDIError(4, 0,
error,"explanation"));
            throw new XDException(XD.RULE, XD.RULE_VIOLATION,"node
value "+value+" is not 'Value'");
         }
    }
}
```

Rule violations should throw an XDException describing the violation.

The parental class provides a group of services to assist in preparing rules:

Method	Purpose
boolean isYYYYMMDD(String date)	Validates that a date is formatted correctly.
boolean isInList(String list, String value)	The value must be in the list.
void trace(int level, String msg)	The text of the message is written to the system trace file. The level should be XD.TRACE_DEBUG, XD.TRACE_ERROR, or XD.TRACE_ALL.

Rules can also use all methods in XDNode to address the values in the passed node and the tree in general.

Rule violations must be returned as XDExceptions of class XD.RULE. Two causes are available: XD.RULE_SYNTAX if the rule is in error, and XD.RULE_VIOLATION if the data violates the rule. Syntax errors cause the document to be aborted, since it is presumed that rules have been debugged. Violations are posted to the node by the rule, and the engine continues to process the document. Violations are traced by the engine and affect the later acknowledgement generation.

The error itself is posted to the node using the standard XDNode service setAssociatedVector (Object o), which records an object with the node. The special EDIError object, shown above, contains four elements:

Element	Meaning
`Class`	Class of the error. Should be 4 for a syntax error, resulting in AK4.
`Reserved`	Must be 0.
`Error code`	Code to be returned in the AKx (997).
`Explanation`	A string explaining the error. For use in tracing.

Writing Rule Search Routines in Java

Short lists can be searched by built-in rule engine code. Longer lists, where the values in the list are obtained from an external source rather than from the attribute directly, require a rule list searcher tailored to the source. Lists might be obtained from a:

- Simple file.
- Database with values loaded at startup.
- Database with an access at each search request.

Each list may require its own search logic, tailored to the source and format of the list itself. To accommodate this, the rule engine allows list-specific search routines to be developed and added to the system. These routines are loaded at system initialization and terminated at system closedown. Each routine must offer a search method that determines whether the passed value is valid.

Search routines must extend the *XDRuleList class*, which is part of the com.ibi.edaqm.*XDRuleClass* edaqm package. The routine must offer three methods in the manner common to all XD extensions:

- init (String[ ] args) is called once at system initialization.
- term ( ) is called once at system termination. This method is called optionally.
- search (String value) is called when the rule is executed.

The Rule List search code is identified in the <preload> section of the <system> area of the dictionary. The Preloads console page manages this section.

```
      <preload>
         <name file="RuleFileList(c:\ziplist.txt)"
comment="validates zip codes">ziplist</name>
      </preload>
```

The following code specifies that a rule can be written that names the preloaded routine. This routine might load a list from a text file:

```
<rule tag=”xxx” code=”@ziplist” method=”checklist”/>
```

Example: Loading a Java File

The following is an example of loading a file containing codes:

```
import com.ibi.edaqm.*;
import java.util.*;
import java.io.*;
/**
 * A rule list handler is a routine called to enable users serach lists during
execution
 * or the checkList rule. checkList() is a generally available rule to test whether
the
 * contents of a document field are valid.  The rule list handler is invoked when
 * the code= attribute indicates the name of a coder routine rather than a simple
list.<P>
 * For example, <I>code="@list1"</I> will cause the search routine of the list1
class to
 * be invoked.<P>
 * The file read by this procedure consists of tokens separated by new line, white
space or commas.
 */
public class XDRuleListFile extends XDRuleList
{
        String[] list;
        ArrayList al = new ArrayList(127);
        public XDRuleListFile()
        {
        }
        /**
         * The init method is called when a rule is loaded. It can perform any
necessary
        * initialization, and can store any persistent information in the object
store.
         *
        * @param parms  Array of parameter string passed within the start command
init-name(parms).
         */
        public void init(String[] parms) throws XDException
        {
            if (parms == null)
            {

                            throw new XDException(XD.RULE, XD.RULE_SYNTAX, "no
              parms sent to " + name);
                        }
                        try
                        {
                            File  f = new File(parms[0]);
                            FileInputStream fs = new FileInputStream(f);
```

```
                long len = f.length();
                byte[] b = new byte[(int)len];
                fs.read(b);
                fs.close();
                String data = new String(b);
                StringTokenizer st = new StringTokenizer(data, ",
" + XD.NEWLINE);
                while (st.hasMoreTokens())
                {
                    String part = st.nextToken();
                    al.add(part);
                }
            }
            catch (FileNotFoundException e)
            {
              throw new XDException(XD.RULE, XD.RULE_SYNTAX, "list
file "+parms[0] + " not found");
            }
            catch (IOException eio)
            {
                throw new XDException(XD.RULE, XD.RULE_SYNTAX,
eio.toString());
            }
        }
        /**
       * The term() method is called when the worker is terminated.
It is NOT guaranteed
         * to be call, and applications should not rely upon this
method to update data bases or
         * perform other critical operations.
         */
        public void term()
        {
        }
        /**
        * Search the given value to determine whether it is in the
list.
         *
         * @param value  String to test against the list
         * @return true if found, false otherwise
         */
        public boolean search(String value)
        {
            return al.contains(value);
        }
}
```

A HL7 Document Index

This section documents the reference material supplied with the BEA WebLogic Adapter for HL7. It includes the following topics:

Message Definition Files

This section discusses the two main schema files that describe the HL7 messages (`Message.xsd` and `Segments.xsd`). These files describe to the HL7 parser how the HL7 messages are formatted.

Messages.xsd

Listing A-1 Messages.xsd

```
<?xml version = "1.0" encoding = "ISO-8859-1" ?>
 <schema>

 <!-- MESSAGE ORU_R01 -->
 <!-- .. groups used in message ORU_R01 -->
 <element name="ORU_R01.GROUP.1">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="OBX" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NTE" />
    </sequence>
  </complexType>
</element>
<element name="ORU_R01.GROUP.2">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="ORC" />
      <element minOccurs="1" maxOccurs="1" ref="OBR" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NTE" />
      <element minOccurs="1" maxOccurs="unbounded" ref="ORU_R01.GROUP.1" />
      <element minOccurs="0" maxOccurs="unbounded" ref="CTI" />
    </sequence>
  </complexType>
</element>
<element name="ORU_R01.GROUP.3">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="PID" />
      <element minOccurs="0" maxOccurs="1" ref="PD1" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NTE" />
      <element minOccurs="0" maxOccurs="1" ref="ORU_R01.GROUP.5" />
    </sequence>
  </complexType>
</element>
<element name="ORU_R01.GROUP.4">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="ORU_R01.GROUP.3" />
      <element minOccurs="1" maxOccurs="unbounded" ref="ORU_R01.GROUP.2" />
    </sequence>
  </complexType>
```

```
</element>
<element name="ORU_R01.GROUP.5">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="PV1" />
      <element minOccurs="0" maxOccurs="1" ref="PV2" />
    </sequence>
  </complexType>
</element>
<!-- .. message definition ORU_R01 -->
<element name="ORU_R01">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="MSH" />
      <element minOccurs="1" maxOccurs="unbounded" ref="ORU_R01.GROUP.4" />
      <element minOccurs="0" maxOccurs="1" ref="DSC" />
    </sequence>
  </complexType>
</element>
</schema>
```

This section from the schema file defines the message type ORU of event R01. There are numerous groups and sub-groups, which detail the sub-sections of the message. Some of these sub-sections are required, for example, ORU_RO1.GROUP.4, and others are allowed to occur numerous times, for example, ORU_RO1.GROUP.2.

Segments.xsd

The following schema describes all the fields that make up each of the segments used in message ORU of event R01.

Listing A-2 Segments.xsd

```
<?xml version = "1.0" encoding = "ISO-8859-1" ?>
<schema>

<!-- SEGMENT MSH -->
<element name="MSH">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="MSH.FIELD_SEP" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.ENCDNG_CHRS" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.SND_APP" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.SND_FAC" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.RCV_APP" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.RCV_FAC" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.MSG_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.SECURITY" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.MSG_TYPE" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.MSG_CNTRL_ID" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.PRCSNG_ID" />
      <element minOccurs="1" maxOccurs="1" ref="MSH.VRSN_ID" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.SQNC_NM" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.CNTN_PNTR" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.ACCPT_ACK_TYP" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.APP_ACK_TYP" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.CNTRY_CDE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="MSH.CHAR_SET" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.MSG_LANG" />
      <element minOccurs="0" maxOccurs="1" ref="MSH.ALT_CHAR_SET" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT PID -->
<!-- Patient Identificaion segment -->
<element name="PID">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="PID.SET_ID" />
      <element minOccurs="0" maxOccurs="1" ref="PID.PATNT_ID" />
      <element minOccurs="1" maxOccurs="unbounded" ref="PID.PATNT_ID_LST" />
```

```
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.ALT_PATNT_ID" />
      <element minOccurs="1" maxOccurs="unbounded" ref="PID.PATNT_NAME" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.MTHR_MDN_NME" />
      <element minOccurs="0" maxOccurs="1" ref="PID.DOB" />
      <element minOccurs="0" maxOccurs="1" ref="PID.SEX" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.ALIAS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.RACE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.PATNT_ADDRSS" />
      <element minOccurs="0" maxOccurs="1" ref="PID.COUNTY_CDE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.PHNE_HME" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.PHNE_BUS" />
      <element minOccurs="0" maxOccurs="1" ref="PID.PRMRY_LANG" />
      <element minOccurs="0" maxOccurs="1" ref="PID.MRTL_STS" />
      <element minOccurs="0" maxOccurs="1" ref="PID.RLGN" />
      <element minOccurs="0" maxOccurs="1" ref="PID.PATNT_ACC_NM" />
      <element minOccurs="0" maxOccurs="1" ref="PID.SSN_NM" />
      <element minOccurs="0" maxOccurs="1" ref="PID.DRVR_LCNS_NM /> 
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.MTHR_ID" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.ETHNIC_GRP" />
      <element minOccurs="0" maxOccurs="1" ref="PID.BRTH_PLC" />
      <element minOccurs="0" maxOccurs="1" ref="PID.MLTPL_BRTH_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PID.BRTH_ORDR" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PID.CTZNSHP" />
      <element minOccurs="0" maxOccurs="1" ref="PID.VTRNS_MIL_STS" />
      <element minOccurs="0" maxOccurs="1" ref="PID.NTNLTY" />
      <element minOccurs="0" maxOccurs="1" ref="PID.PATNT_DTH_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="PID.PATNT_DTH_IND" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT PD1 -->
<!-- Patient Additional Demographic segment -->

<element name="PD1">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="unbounded" ref="PD1.LVNG_DPNDCY" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.LVNG_ARRNGMNT" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PD1.PATNT_PRM_FAC" />
     <element minOccurs="0" maxOccurs="unbounded" ref="PD1.PATNT_PRM_CARE_PRV" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.STDNT_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.HANDICAP" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.LVNG_WILL" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.ORGN_DNR" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.SEPARATE_BILL" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PD1.DUP_PATNT" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.PBLCTY_CDE" />
      <element minOccurs="0" maxOccurs="1" ref="PD1.PRTCTN_IND" />
```

```
    </sequence>
  </complexType>
</element>

<!-- SEGMENT NK1 -->
<!-- Next of kin / associated parties segment  -->
<element name="NK1">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="NK1.SET_ID" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.NME" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.RLTNSHP" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.ADDRSS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.PHNE_NM " />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.BUS_PHNE_NM" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.CNTCT_RLE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.STRT_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.END_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.KIN_JOB_TITLE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.KIN_JOB_CDE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.KIN_EMP_NM" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.ORG_NME" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.MRTL_STS" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.SEX" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.DOB" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.LVNG_DPNDCY" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.AMBLTRY_STS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.CTZNSHP" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.PRM_LANG" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.LVNG_ARNGMNT" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.PBLCTY_CDE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.PRTCTN_IND" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.STDNT_IND" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.RLGN" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.MOTH_MDN_NME" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.NTNLTY" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.ETHNC_GRP" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.CNTCT_RSN" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.CNTCT_PRSN_NME" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.CNTCT_PRSN_NUM" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.CNTCT_PRSN_ADD" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.KIN_ID" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.JOB_STS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NK1.RACE" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.HANDICAP" />
      <element minOccurs="0" maxOccurs="1" ref="NK1.CNTCT_PRSN_SSN" />
    </sequence>
  </complexType>
</element>
```

```
<!-- SEGMENT NTE -->
<!-- Notes and comments segment -->
<element name="NTE">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="NTE.SET_ID" />
      <element minOccurs="0" maxOccurs="1" ref="NTE.SRC" />
      <element minOccurs="0" maxOccurs="unbounded" ref="NTE.CMNT" />
      <element minOccurs="0" maxOccurs="1" ref="NTE.CMNT_TYP" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT PV1 -->
<!-- Patient visit segment -->
<element name="PV1">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="PV1.SET_ID" />
      <element minOccurs="1" maxOccurs="1" ref="PV1.PATNT_CLSS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ASGND_PATNT_LCTN" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ADMSN_TYP" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PREADMT_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PRIOR_PATNT_LOC" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.ATNDNG_DCTR" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.RFRNG_DCTR" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.CNSLTNG_DCTR" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.HSPTL_SRVCE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TMP_LOC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PREADMIT_TST_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.READMSSN_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ADMNT_SRC" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.AMBLTRY_STS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.VIP_IND" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.ADMTTNG_DCTR" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PATNT_TYP" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.VST_NUM" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.FNCL_CLSS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.CHRG_PRC_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.CRTSY_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.CRDT_RTNG" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.CNTRCT_CODE" />
     <element minOccurs="0" maxOccurs="unbounded" ref="PV1.CNTRCT_EFFCTV_DTE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.CNTRCT_AMMNT" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.CNTRCT_PRD" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.INTRST_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TRNSFR_BAD_DEBT_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TRNSFR_BAD_DEBT_DTE" />
```

```
      <element minOccurs="0" maxOccurs="1" ref="PV1.BAD_DEBT_AGNCY_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.BAD_DEBT_TRNSFR_AMNT" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.BAD_DEBT_RCVRY_AMNT" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.DLT_ACCNT_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.DLT_ACCNT_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.DSCHRG_DSPSTN" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.DSCHRG_LOC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.DIET_TYP" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.SRVCNG_FAC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.BED_STS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ACCNT_STS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PNDNG_LOC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.PRIOR_TMP_LOC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ADMT_DTE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV1.DSCHRG_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.CRRNT_PATNT_BLNC" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TOT_CHRGS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TOT_ADJSMNTS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.TOT_PYMNTS" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.ALTRNT_VST_ID" />
      <element minOccurs="0" maxOccurs="1" ref="PV1.VST_IND" />
     <element minOccurs="0" maxOccurs="unbounded" ref="PV1.OTHR_HLTHCR_PRVDR" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT PV2 -->
<!--atient visit additional information segment -->
<element name="PV2">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="PV2.PRIOR_PNDNG_LOC" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.ACCMMDTN_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.ADMT_RSN" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.TRNSFR_RSN" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV2.PATNT_VAL" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PATNT_VAL_LOC" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV2.VST_USR_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EXPCTD_ADMT_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EXPCTD_DSCHRG_DATETIME" />
     <element minOccurs="0" maxOccurs="1" ref="PV2.ESTMTD_LNGTH_INPATNT_STAY" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.ACTL_LNGTH_INPATNT_STAY" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.VST_DSCRPTN" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV2.RFRRL_SRC_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PRVS_SRVC_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EMPLYMNT_ILLNSS_RLTD_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PRG_STS_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PRG_STS_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.SPCL_PRGM_CODE" />
```

```
      <element minOccurs="0" maxOccurs="1" ref="PV2.RTNTN_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EXPCTD_NUM_INSRNC_PLNS" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.VST_PBLCTY_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.VST_PRTCTN_IND" />
      <element minOccurs="0" maxOccurs="unbounded" ref="PV2.CLNC_ORG_NAME" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PATNT_STS_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.VST_PRTY_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.PRVS_TRTMNT_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EXPCTD_DSCHRGE_DSPSTN" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.SGNTRE_ON_FILE_DTE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.FRST_SMLR_ILLNSS_DTE" />
     <element minOccurs="0" maxOccurs="1" ref="PV2.PATNT_CHRGE_ADJSTMNT_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.RCRRNG_SRVCE_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.BLLNG_MEDIA_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.EXPCTD_SRGRY_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.MLTRY_PRTNRSHP_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.MLTRY_NON_AVLBLTY_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.NWBRN_BABY_IND" />
      <element minOccurs="0" maxOccurs="1" ref="PV2.BABY_DTND_IND" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT ORC -->
<!-- Common Order segment -->
<element name="ORC">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="ORC.ORDR_CNTRL" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.PLCR_ORDR_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.FLLR_ORDR_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.PLCR_GRP_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ORDR_STS" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.RSPNS_FLG" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.QNTY_TMNG" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.PARENT" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.XN_DATETIME" />
      <element minOccurs="0" maxOccurs="unbounded" ref="ORC.ENTRD_BY" />
      <element minOccurs="0" maxOccurs="unbounded" ref="ORC.VRFD_BY" />
      <element minOccurs="0" maxOccurs="unbounded" ref="ORC.ORDRNG_PRVDR" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ENTRS_LOC" />
      <element minOccurs="0" maxOccurs="unbounded" ref="ORC.14" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.CLL_BCK_PHNE_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ORDR_EFF_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ORDR_CNTRL_CODE_RSN" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ENTRNG_ORG" />
      <element minOccurs="0" maxOccurs="unbounded" ref="ORC.ENTRNG_DVCE" />
      <element minOccurs="0" maxOccurs="1" ref="ORC.ADNVCD_BNFCRY_NTCE_CODE" />
    </sequence>
```

```
  </complexType>
</element>


<!-- SEGMENT OBR -->
<!-- Observation request segment -->
<element name="OBR">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="OBR.SET_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PLCR_ORDR_NUM" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.FLLR_ORDR_NUM" />
      <element minOccurs="1" maxOccurs="1" ref="OBR.UNVRSL_SRVCE_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PRIORITY" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.RQSTD_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.OBSRVTN_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.OBSRVTN_END_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.CLLCTN_VLME" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.CLLCTN_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.SPCMN_ACTN_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.DNGR_CODE" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.RLVNT_CLNCL_INF" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.SPCMEN_RCVD_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.SPCMEN_SRC" />
      <element minOccurs="0" maxOccurs="unbounded" ref=" OBR.ORDRNG_PRVDR " />
    <element minOccurs="0" maxOccurs="unbounded" ref="OBR.ORDR_CLLBCK_PHNE_NUM"
/>
      <element minOccurs="0" maxOccurs="1" ref="OBR.PLCR_FLD_1" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PLCR_FLD_2" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.FLLR_FLD_1" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.FLLR_FLD_2" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.RPRT_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.CHRG_TO_PRCTCE" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.DGNSTC_SRV_SCT_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.RSLT_STS" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PRNT_RSLT" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.QNTY_TMNG" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.RSLT_COPIES_TO" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PRNT" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.TRNSPRTN_MDE" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.RSN_FOR_STDY" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.PRNCPL_RSLT_INTRPRTR" />
    <element minOccurs="0" maxOccurs="unbounded" ref="OBR.ASSTNT_RSLT_INTRPRTR"
/>
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.TCHNCN" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.TRNSCRPTNST" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.SCHDLD_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.NUM_SMPL_CNTNRS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.TRNSPRT_LGSTCS" />
```

```
      <element minOccurs="0" maxOccurs="unbounded" ref="OBR.CLLCTRS_CMMNT" />
     <element minOccurs="0" maxOccurs="1" ref="OBR.TRNSPRT_ARRNGMNT_RSPNSBLTY" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.TRNSPRT_ARRNGD" />
      <element minOccurs="0" maxOccurs="1" ref="OBR.ESCRT_RQRD" />
      <element minOccurs="0" maxOccurs="unbounded"
ref="OBR.PLNND_PATNT_TRNSPRT_CMMNT" />
     </sequence>
  </complexType>
</element>

<!-- SEGMENT OBX -->
<!-- Observation/result segment -->
<element name="OBX">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="OBX.SET_ID" />
      <element minOccurs="1" maxOccurs="1" ref="OBX.VALUE_TYP" />
      <element minOccurs="1" maxOccurs="1" ref="OBX.OBSRVTN_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.OBSRVTN_SUB_ID" />
      <element minOccurs="1" maxOccurs="1" ref="OBX.OBSRVTN_VALUE" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.UNITS" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.RFRNCS_RNG" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.ABNRML_FLGS" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBX.PRBLTY" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.NATURE_OF_ABNRML_TST" />
      <element minOccurs="1" maxOccurs="1" ref="OBX.OBSRV_RSLT_STS" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.DATE_LST_OBS_NRML_VAL" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.USR_DFND_ACCSS_CHKS" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.OBSV_DATETIME" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.PRDCERS_ID" />
      <element minOccurs="0" maxOccurs="1" ref="OBX.RSPNSBLE_OBSRVR" />
      <element minOccurs="0" maxOccurs="unbounded" ref="OBX.OBSRVTN_MTHD" />
    </sequence>
  </complexType>
</element>

<!-- SEGMENT CTI -->
<element name="CTI">
  <complexType>
    <sequence>
      <element minOccurs="1" maxOccurs="1" ref="CTI.SPNSR_STDY_ID" />
      <element minOccurs="0" maxOccurs="1" ref="CTI.STDY_PHSE_ID" />
      <element minOccurs="0" maxOccurs="1" ref="CTI.STDY_SCHDLD_TIME_PNT" />
    </sequence>
  </complexType>
</element>


<!-- SEGMENT DSC -->
```

```
<element name="DSC">
  <complexType>
    <sequence>
      <element minOccurs="0" maxOccurs="1" ref="DSC.CNTNTN_PNTR" />
    </sequence>
  </complexType>
</element>
</schema>
```

Field Definitions

The field definitions file, `FIELDS.xsd`, defines field definitions. The field definition includes a long name (descriptive definition) and a reference to the data type. For more information about the data type definition, see "Data Type Definitions" on page A-26.

Listing A-3 Field Definitions

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<schema>
<ACC_DATE_TIME longName="Date Time" type="TS"/>
<ACC_CODE longName="Code" type="CE"/>
<ACC_LOCATION longName="Location Time" type="ST"/>
<ACC_AUTO_STATE longName="State Auto Accident occured in" type="CE"/>
<ACC_JOB_IND longName="Job Accident Indicator" type="ID"/>
<ACC_DEATH_IND longName="Death Indicator" type="ID"/>
<AL1_ID longName="ID" type="SI"/>
<AL1_ALLERGEN_TYPE longName="Allergen Type Code" type="IS"/>
<AL1_ALLERGEN_DESC longName="Allergen Code Description" type="CE"/>
<AL1_ALLERGY_SEVERITY longName="Allergy severity code" type="IS"/>
<AL1_ALLERGY_REACTION longName="Allergy Reacation code" type="ST"/>
<AL1_ID_DATE longName="Identification Date" type="DT"/>
<DB1_ID longName="ID" type="SI"/>
<DB1_PERSON_CODE longName="Disabled Person Code" type="IS"/>
<DB1_PERSON_ID longName="Disabled Person Identifier" type="CX"/>
<DB1_INDICATOR longName="Disability Indicator" type="ID"/>
<DB1_START_DATE longName="Disability Start Date" type="DT"/>
<DB1_END_DATE longName="Disability End Date" type="DT"/>
<DB1_RETURN_WORK longName="Disability Return to Work Date" type="DT"/>
<DB1_UNABLE_WORK longName="Disability Unable to Work Date" type="DT"/>
<DG1_ID longName="ID" type="SI"/>
<DG1_CODE_METHOD longName="Diagnosis Coding Method" type="ID"/>
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<DG1_DESC longName="Diagnosis Description" type="ST"/>
<DG1_DATE longName="Diagnosis Date Time" type="TS"/>
<DG1_TYPE longName="Diagnosis Type" type="IS"/>
<DG1_MAJOR_CAT longName="Major diagnosis category" type="CE"/>
<DG1_RELATED_GROUP longName="Diagnostic Related Group" type="CE"/>
<DG1_DRG_APP_IND longName="DRG Approval Indicator" type="ID"/>
<DG1_DRG_GRP_REV_CODE longName="DRG Grouper Review code" type="IS"/>
<DG1_OUTLIER_TYPE longName="Outlier Type" type="CE"/>
<DG1_OUTLIER_DAYS longName="Outlier Days" type="NM"/>
<DG1_OUTLIER_COST longName="Outlier Cost" type="CP"/>
<DG1_GRP_VER_TYPE longName="Grouper Version and Type" type="ST"/>
<DG1_PRIORITY longName="Diagnosis Priority" type="ID"/>
<DG1_CLINICIAN longName="Diagnosing Clinician" type="XCN"/>
<DG1_CLASS longName="Diagnosis Classification" type="IS"/>
<DG1_CONFID_IND longName="Confidential Indicator" type="ID"/>
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<DRG_ASSIGNED_DATE longName="DRG Assigned Date Time" type="TS"/>
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<EVN_DATE_PLANNED_EVN longName="Date Time Planned Event" type="TS"/>
<EVN_REASON_CODE longName="Event Reason Code" type="IS"/>
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<EVN_OCCURRED longName="Event Occurred" type="TS"/>
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<GT1_NUMBER longName="Guarantor Number" type="CX"/>
<GT1_NAME longName="Guarantor Name" type="XPN"/>
<GT1_SPOUSE_NAME longName="Guarantor Spouse Name" type="XPN"/>
<GT1_ADDRESS longName="Guarantor Address" type="XAD"/>
<GT1_PHONE_HOME longName="Guarantor Phone number Home" type="XTN"/>
<GT1_PHONE_BUSINESS longName="Guarantor Phone number business" type="XTN"/>
<GT1_DOB longName="Guarantor Date Time of Birth" type="TS"/>
<GT1_ADMIN_SEX longName="Guarantor Administrative sex" type="IS"/>
<GT1_TYPE longName="Guarantor type" type="IS"/>
<GT1_RELATIONSHIP longName="Guarantor relationship" type="CE"/>
<GT1_SSN longName="Guarantor SSN" type="ST"/>
<GT1_DATE_BEGIN longName="Guarantor Date Begin" type="DT"/>
<GT1_DATE_END longName="Guarantor Date End" type="DT"/>
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<GT1_EMPLOYER_NAME longName="Guarantor Employer Name" type="XPN"/>
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<GT1_EMPLOYMENT_STATUS longName="Guarantor Employment Status" type="IS"/>
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<GT1_BILL_HOLD_FLG longName="Guarantor Billing Hold Flag" type="ID"/>
<GT1_CREDIT_RATING longName="Guarantor Credit Rating Code" type="CE"/>
<GT1_DEATH_DATE longName="Guarantor Death Date and Time" type="TS"/>
<GT1_DEATH_FLG longName="Guarantor Death Flag" type="ID"/>
<GT1_CHARGE_ADJ longName="Guarantor Charge Adjustment Code" type="CE"/>
<GT1_HOUSEHOLD_INCOME longName="Guarantor Houshold annual income" type="CP"/>
<GT1_HOUSEHOLD_SIZE longName="Guarantor Household size" type="NM"/>
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<GT1_MARITAL_STATUS longName="Guarantor Maritial Status code" type="CE"/>
<GT1_HIRE_EFF_DATE longName="Guarantor Hire Effective Date" type="DT"/>
<GT1_EMPLOY_STOP_DATE longName="Employment Stop Date" type="DT"/>
<GT1_LIVING_DEPEND longName="Living Dependency" type="IS"/>
<GT1_AMBULATORY_STAT longName="Ambulatory Status" type="IS"/>
<GT1_CITIZEN longName="Citzenship" type="CE"/>
<GT1_PRIMARY_LANG longName="Primary Language" type="CE"/>
<GT1_LIVING_ARRANG longName="Living Arrangement" type="IS"/>
<GT1_PUB_CODE longName="Publicity Code" type="CE"/>
<GT1_PROTECT_IND longName="Protection Indicator" type="ID"/>
<GT1_STUDENT_IND longName="Student Indicator" type="IS"/>
<GT1_RELIGION longName="Religion" type="CE"/>
<GT1_MOTHER_MAIDEN_NAME longName="Mother Maiden Name" type="XPN"/>
<GT1_NATIONALITY longName="Nationality" type="CE"/>
<GT1_ETHNIC_GROUP longName="Ethnic Group" type="CE"/>
<GT1_CONTACT_NAME longName="Contact Persons Name" type="XPN"/>
<GT1_CONTACT_PHONE longName="Contact Persons Phone number" type="XTN"/>
<GT1_CONTACT_REASON longName="Contact Reason" type="CE"/>
<GT1_CONTACT_RELATION longName="Contact relationship" type="IS"/>
<GT1_JOB_TITLE longName="Job title" type="ST"/>
<GT1_JOB_CODE longName="Job code" type="JCC"/>
<GT1_EMP_ORG_NAME longName="Guarantor Employers Organization Name" type="XON"/>
<GT1_HANDICAP longName="Handicap" type="IS"/>
<GT1_JOB_STATUS longName="Job Status" type="IS"/>
<GT1_FIN_CLASS longName="Guarantor Financial Class" type="FC"/>
<GT1_RACE longName="Guarantor Race" type="CE"/>
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<IN1_PLAN_ID longName="Insurance Plan ID" type="CE"/>
<IN1_COMPANY_ID longName="Insurance Company ID" type="CX"/>
<IN1_COMPANY_NAME longName="Insurance Company Name" type="XON"/>
<IN1_COMPANY_ADD longName="Insurance Company Address" type="XAD"/>
<IN1_COMPANY_CONTACT longName="Insurance Company Contact" type="XPN"/>
<IN1_COMPANY_CONTACT_TEL longName="Insurance Company Tel No" type="XTN"/>
<IN1_GROUP_NUMBER longName="Group Number" type="ST"/>
<IN1_GROUP_NAME longName="Group Name" type="XON"/>
<IN1_GROUP_EMP_ID longName="Insured Group Emp Id" type="CX"/>
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<IN1_GROUP_EMP_NAME longName="Insured Group Emp Name" type="XON"/>
<IN1_PLAN_EFF_DATE longName="Plan Effective Date" type="DT"/>
<IN1_PLAN_EXP_DATE longName="Plan Expiration Date" type="DT"/>
<IN1_AUTH_INFO longName="Authorization Information" type="CM_AI"/>
<IN1_PLAN_TYPE longName="Plan Type" type="IS"/>
<IN1_NAME_INSURED longName="Name of Insured" type="XPN"/>
<IN1_INSURED_RELATION longName="Insured relationship to Patient" type="CE"/>
<IN1_INSURED_DOB longName="Insured Date Of Birth" type="TS"/>
<IN1_INSURED_ADD longName="Insured Address" type="XAD"/>
<IN1_ASSIGN_BENEFIT longName="Assignment of Benefits" type="IS"/>
<IN1_COORD_BENEFIT longName="Coordination of Benefits" type="IS"/>
<IN1_COORD_BENEFIT_PRIOR longName="Coord of Benefits priority" type="ST"/>
<IN1_NOTICE_ADMIS_FLG longName="Notice of Admission Flag" type="ID"/>
<IN1_NOTICE_ADMIS_DATE longName="Notice of Admission Date" type="DT"/>
<IN1_REP_ELIG_FLG longName="Report of Eligibility Flag" type="ID"/>
<IN1_REP_ELIG_DATE longName="Report of Eligibility Date" type="DT"/>
<IN1_RELEASE_INFO_CODE longName="Release Information Code" type="IS"/>
<IN1_PREADMIT_CERT longName="PreAdmit Certificate" type="ST"/>
<IN1_VERIFICATION_DATE longName="Verification Date Time" type="TS"/>
<IN1_VERIFICATION_BY longName="Verificaiton By" type="XCN"/>
<IN1_TYPE_AGREE_CODE longName="Type of Agreement code" type="IS"/>
<IN1_BILLING_STATUS longName="Billing Status" type="IS"/>
<IN1_LIFETIME_RESERVE_DAYS longName="Lifetime Reserve Days" type="NM"/>
<IN1_DELAY_BEFORE_LR_DAY longName="Delay Before LR Days" type="NM"/>
<IN1_COMPANY_PLAN_CODE longName="Company Plan Code" type="IS"/>
<IN1_POLICY_NUMBER longName="Policy Number" type="ST"/>
<IN1_POLICY_DEDUCT longName="Policy Deductible" type="CP"/>
<IN1_POLICY_LIMIT_AMT longName="Policy Limit Amount" type="CP"/>
<IN1_POLICY_LIMIT_DAYS longName="Policy Limit Days" type="NM"/>
<IN1_ROOM_RATE_SEMI_PRIV longName="Room Rate Semi private" type="CP"/>
<IN1_ROOM_RATE_PRIV longName="Room Rate private" type="CP"/>
<IN1_INSURED_EMPLOY_STAT longName="Insured Employment Status" type="CE"/>
<IN1_INSURED_ADMIN_SEX longName="Insured Administrative Sex" type="IS"/>
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<IN1_PRIOR_INS_PLAN longName="Prior Insurance Plan ID" type="IS"/>
<IN1_COVER_TYPE longName="Coverage Type" type="IS"/>
<IN1_HANDICAP longName="Handicap" type="IS"/>
<IN1_INSURED_ID longName="Insured ID Number" type="CX"/>
<IN2_EMPLOYEE_ID longName="Insureds Employee ID" type="CX"/>
<IN2_SSN longName="Insureds Social Security Number" type="ST"/>
<IN2_EMPLOYER_NAME longName="Insureds Employers Name and ID" type="XCN"/>
<IN2_EMPLOYER_INFO longName="Employer Information Data" type="IS"/>
<IN2_MAIL_CLAIM_PARTY longName="Mail Claim Party" type="IS"/>
<IN2_MEDICARE_CARD_NO longName="Medicare Health Ins Card Number" type="ST"/>
<IN2_MEDICAID_CASE_NAME longName="Medicaid Case Name" type="XPN"/>
<IN2_MEDICAID_CASE_NUMBER longName="Medicaid Case Number" type="ST"/>
<IN2_MILITARY_SPONSOR longName="Military Sponsor Name" type="XPN"/>
<IN2_MILITARY_ID longName="Military ID Number" type="ST"/>
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<IN2_DEP_MILITARY_RECIPIENT longName="Dependent Of Military Recipient"
type="CE"/>
<IN2_MILITARY_ORG longName="Military Organization" type="ST"/>
<IN2_MILITARY_STATION longName="Military Station" type="ST"/>
<IN2_MILITARY_SERVICE longName="Military Service" type="IS"/>
<IN2_MILITARY_RANK longName="Military Rank" type="IS"/>
<IN2_MILITARY_STATUS longName="Military Status" type="IS"/>
<IN2_MILITARY_RETIRE_DATE longName="Military Retire Date" type="DT"/>
<IN2_MILITARY_NON_AVAIL_COF longName="Military Non-Avail Cert On File"
type="ID"/>
<IN2_BABY_COVERAGE longName="Baby Coverage" type="ID"/>
<IN2_COMBINE_BABY_BILL longName="Combine Baby Bill" type="ID"/>
<IN2_BLOOD_DEUCT longName="Blood Deductible" type="ST"/>
<IN2_SPEC_COVER_APP_NAME longName="Special Coverage Approval Name" type="XPN"/>
<IN2_SPEC_COVER_APP_TITLE longName="Special Coverage Approval Title" type="ST"/>
<IN2_NON_COVER_INS_CODE longName="Non-Covered Insurance Code" type="IS"/>
<IN2_PAYOR_ID longName="Payor ID" type="CX"/>
<IN2_PAYOR_SUBSCRIBE_ID longName="Payor Subscriber ID" type="CX"/>
<IN2_ELIG_SOURCE longName="Eligibility Source" type="IS"/>
<IN2_ROOM_COVER_TYPE longName="Room Coverage Type Amount" type="CM_RMC"/>
<IN2_POLICY_TYPE longName="Policy Type Amount" type="CM_PTA"/>
<IN2_DAILY_DEDUCT longName="Daily Deductible" type="CM_DDI"/>
<IN2_LIVING_DEPEND longName="Living Dependency" type="IS"/>
<IN2_AMBULATORY_STATUS longName="Ambulatory Status" type="IS"/>
<IN2_CITIZEN longName="Citizenship" type="CE"/>
<IN2_PRIMARY_LANG longName="Primary Language" type="CE"/>
<IN2_LIVING_ARRANG longName="Living Arrangement" type="IS"/>
<IN2_PUB_CODE longName="Publicity Code" type="CE"/>
<IN2_PROTECT_IND longName="Protection Indicator" type="ID"/>
<IN2_STUDENT_IND longName="Student Indicator" type="IS"/>
<IN2_RELIGION longName="Religion" type="CE"/>
<IN2_MOTHER_MAIDEN_NAME longName="Mothers Maiden Name" type="XPN"/>
<IN2_NATIONALITY longName="Nationality" type="CE"/>
<IN2_ETHNIC_GROUP longName="Ethnic Group" type="CE"/>
<IN2_MARITAL_STATUS longName="Marital Status" type="CE"/>
<IN2_EMPLOY_START_DATE longName="Insureds Employment Start Date" type="DT"/>
<IN2_EMPLOY_STOP_DATE longName="Employment Stop Date" type="DT"/>
<IN2_JOB_TITLE longName="Job Title" type="ST"/>
<IN2_JOB_CODE longName="Job Code Class" type="JCC"/>
<IN2_JOB_STATUS longName="Job Status" type="IS"/>
<IN2_EMPLOYER_CONTACT_NAME longName="Employer Contact Person Name" type="XPN"/>
<IN2_EMPLOYER_CONTACT_TEL longName="Employer Contact Person Phone Number"
type="XTN"/>
<IN2_EMPLOYER_CONTACT_REASON longName="Employer Contact Reason" type="IS"/>
<IN2_INSURED_CONTACT_NAME longName="Insureds Contact Persons Name" type="XPN"/>
<IN2_INSURED_CONTACT_TEL longName="Insureds Contact Person Phone Number"
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<IN2_INSURED_CONTACT_REASON longName="Insureds Contact Person Reason" type="IS"/>
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type="DT"/>
<IN2_RELATION_STOP_DATE longName="Relationship To The Patient Stop Date"
type="DT"/>
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<IN2_INS_CONTACT_TEL longName="Insurance Co Contact Phone Number" type="XTN"/>
<IN2_POLICY_SCOPE longName="Policy Scope" type="IS"/>
<IN2_POLICY_SOURCE longName="Policy Source" type="IS"/>
<IN2_PATIENT_MEMBER_NO longName="Patient Member Number" type="CX"/>
<IN2_GUARANTOR_RELATION longName="Guarantors Relationship To Insured" type="CE"/>
<IN2_INSURED_TEL longName="Insureds Phone Number - Home" type="XTN"/>
<IN2_INSURED_EMPLOYER_TEL longName="Insureds Employer Phone Number" type="XTN"/>
<IN2_MILITARY_HANDICAP_PROG longName="Military Handicapped Program" type="CE"/>
<IN2_SUSPEND_FLG longName="Suspend Flag" type="ID"/>
<IN2_COPAY_LIMIT_FLG longName="Copay Limit Flag" type="ID"/>
<IN2_STOPLOSS_LIMIT_FLG longName="Stoploss Limit Flag" type="ID"/>
<IN2_INSURED_ORG_NAME longName="Insured Organization Name And ID" type="XON"/>
<IN2_INSURED_EMPLOYER_ORG longName="Insured Employer Organization Name And ID"
type="XON"/>
<IN2_RACE longName="Race" type="CE"/>
<IN2_HCFA_RELATION longName="HCFA Patients Relationship to Insured" type="CE"/>
<IN3_ID longName="Set ID - IN3" type="SI"/>
<IN3_CERT_NO longName="Certification Number" type="CX"/>
<IN3_CERT_BY longName="Certified By" type="XCN"/>
<IN3_CERT_REQ longName="Certification Required" type="ID"/>
<IN3_PENALTY longName="Penalty" type="CM_PEN"/>
<IN3_CERT_DATE longName="Certification Date/Time" type="TS"/>
<IN3_CERT_MOD_DATE longName="Certification Modify Date/Time" type="TS"/>
<IN3_OPERATOR longName="Operator" type="XCN"/>
<IN3_CERT_BEGIN_DATE longName="Certification Begin Date" type="DT"/>
<IN3_CERT_END_DATE longName="Certification End Date" type="DT"/>
<IN3_DAYS longName="Days" type="CM_DTN"/>
<IN3_NONCONCUR_CODE longName="Non-Concur Code/Description" type="CE"/>
<IN3_NONCONCUR_EFF_DATE longName="Non-Concur Effective Date/Time" type="TS"/>
<IN3_PHYS_REV longName="Physician Reviewer" type="XCN"/>
<IN3_CERT_CONTACT longName="Certification Contact" type="ST"/>
<IN3_CERT_CONTACT_TEL longName="Certification Contact Phone Number" type="XTN"/>
<IN3_APPEAL_REASON longName="Appeal Reason" type="CE"/>
<IN3_CERT_AGENCY longName="Certification Agency" type="CE"/>
<IN3_CERT_AGENCY_TEL longName="Certification Agency Phone Number" type="XTN"/>
<IN3_PRECERT_REQ_WIN longName="Pre-Certification Req/Window" type="CM_PCF"/>
<IN3_CASE_MANAGER longName="Case Manager" type="ST"/>
<IN3_SEC_OPN_DATE longName="Second Opinion Date" type="DT"/>
<IN3_SEC_OPN_STATUS longName="Second Opinion Status" type="IS"/>
<IN3_SEC_OPN_DOC_RX longName="Second Opinion Documentation Received" type="IS"/>
<IN3_SEC_OPN_PHYS longName="Second Opinion Physician" type="XCN"/>
<PR1_ID longName="Set ID - PR1" type="SI"/>
<PR1_PROC_CODE_METHOD longName="Procedure Coding Method" type="IS"/>
<PR1_PROC_CODE longName="Procedure Code" type="CE"/>
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<PR1_PROC_DESC longName="Procedure Description" type="ST"/>
<PR1_PROC_DATE longName="Procedure Date/Time" type="TS"/>
<PR1_PROC_FUNC_TYPE longName="Procedure Functional Type" type="IS"/>
<PR1_PROC_MINS longName="Procedure Minutes" type="NM"/>
<PR1_ANESTHESIOLOGIST longName="Anesthesiologist" type="XCN"/>
<PR1_ANESTH_CODE longName="Anesthesia Code" type="IS"/>
<PR1_ANESTH_MINS longName="Anesthesia Minutes" type="NM"/>
<PR1_SURGEON longName="Surgeon" type="XCN"/>
<PR1_PROC_PRAC longName="Procedure Practitioner" type="XCN"/>
<PR1_CONSENT_CODE longName="Consent Code" type="CE"/>
<PR1_PROC_PRIORITY longName="Procedure Priority" type="ID"/>
<PR1_ASS_DIAG_CODE longName="Associated Diagnosis Code" type="CE"/>
<PR1_PROC_CODE_MOD longName="Procedure Code Modifier" type="CE"/>
<ROL_ID longName="Role Instance ID" type="EI"/>
<ROL_ACT_CODE longName="Action Code" type="ID"/>
<ROL_ROLE longName="Role-ROL" type="CE"/>
<ROL_PERSON longName="Role Person" type="XCN"/>
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<ROL_END_DATE longName="Role End Date/Time" type="TS"/>
<ROL_DURATION longName="Role Duration" type="CE"/>
<ROL_ACT_REASON longName="Role Action Reason" type="CE"/>
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<UB1_BLOOD_DEDUCT longName="Blood Deductible  (43)" type="NM"/>
<UB1_BLOOD_FURNISHED longName="Blood Furnished-Pints Of (40)" type="NM"/>
<UB1_BLOOD_REPLACED longName="Blood Replaced-Pints (41)" type="NM"/>
<UB1_BLOOD_NOT_REPLACED longName="Blood Not Replaced-Pints(42)" type="NM"/>
<UB1_CO_INS_DAYS longName="Co-Insurance Days (25)" type="NM"/>
<UB1_COND_CODE longName="Condition Code (35-39)" type="IS"/>
<UB1_COVER_DAYS longName="Covered Days - (23)" type="NM"/>
<UB1_NON_COVER_DAYS longName="Non Covered Days - (24)" type="NM"/>
<UB1_VALUE_AMT_CODE longName="Value Amount and Code (46-49)" type="CM_UVC"/>
<UB1_GRACE_DAYS longName="Number Of Grace Days (90)" type="NM"/>
<UB1_SPEC_PROG_IND longName="Special Program Indicator (44)" type="CE"/>
<UB1_PSRO_UR_APP_IND longName="PSRO/UR Approval Indicator (87)" type="CE"/>
<UB1_PSRO_UR_APP_FROM longName="PSRO/UR Approved Stay-Fm (88)" type="DT"/>
<UB1_PSRO_UR_APP_TO longName="PSRO/UR Approved Stay-To (89)" type="DT"/>
<UB1_OCCURRENCE longName="Occurrence (28-32)" type="CM_OCD"/>
<UB1_OCCURRENCE_SPAN longName="Occurrence Span (33)" type="CE"/>
<UB1_OCCUR_SPAN_START_DATE longName="Occur Span Start Date(33)" type="DT"/>
<UB1_OCCUR_SPAN_END_DATE longName="Occur Span End Date (33)" type="DT"/>
<UB1_UB82_LOC2 longName="UB-82 Locator 2" type="ST"/>
<UB1_UB82_LOC9 longName="UB-82 Locator 9" type="ST"/>
<UB1_UB82_LOC27 longName="UB-82 Locator 27" type="ST"/>
<UB1_UB82_LOC45 longName="UB-82 Locator 45" type="ST"/>
<UB2_ID longName="Set ID - UB2" type="SI"/>
<UB2_CO_INS_DAYS longName="Co-Insurance Days (9)" type="ST"/>
<UB2_COND_CODE longName="Condition Code (24-30)" type="IS"/>
<UB2_COVER_DAYS longName="Covered Days (7)" type="ST"/>
<UB2_NON_COVER_DAYS longName="Non-Covered Days (8)" type="ST"/>
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<UB2_OCCURRENCE_SPAN longName="Occurrence Span Code/Dates (36)" type="CM_OSP"/>
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<UB2_UB92_LOC11 longName="UB92 Locator 11 (State)" type="ST"/>
<UB2_UB92_LOC31 longName="UB92 Locator 31 (National)" type="ST"/>
<UB2_DOC_CTRL_NO longName="Document Control Number" type="ST"/>
<UB2_UB92_LOC49 longName="UB92 Locator 49 (National)" type="ST"/>
<UB2_UB92_LOC56 longName="UB92 Locator 56 (State)" type="ST"/>
<UB2_UB92_LOC57 longName="UB92 Locator 57 (National)" type="ST"/>
<UB2_UB92_LOC78 longName="UB92 Locator 78 (State)" type="ST"/>
<UB2_SPEC_VISIT_CNT longName="Special Visit Count" type="NM"/>
<CTI_SPNSR_STDY_ID longName="Sponsor Study ID" type="EI"/>
<CTI_STDY_PHSE_ID longName="Study Phase Identifier" type="CE"/>
<CTI_STDY_SCHDLD_TIME_PNT longName="Study Scheduled Time Point" type="CE"/>
<DSC_CNT_PNTR longName="Continuation Pointer" type="ST"/>
<MSH_FIELD_SEP longName="Field Separator" type="ST"/>
<MSH_ENCDNG_CHRS longName="Encoding Characters" type="ST"/>
<MSH_SND_APP longName="Sending Application" type="HD"/>
<MSH_SND_FAC longName="Sending Facility" type="HD"/>
<MSH_RCV_APP longName="Receiving Application" type="HD"/>
<MSH_RCV_FAC longName="Receiving Facility" type="HD"/>
<MSH_MSG_DATETIME longName="Date/Time Of Message" type="TS"/>
<MSH_SECURITY longName="Security" type="ST"/>
<MSH_MSG_TYPE longName="Message Type" type="CM"/>
<MSH_MSG_CNTRL_ID longName="Message Control ID" type="ST"/>
<MSH_PRCSNG_ID longName="Processing ID" type="PT"/>
<MSH_VRSN_ID longName="Version ID" type="ID"/>
<MSH_SQNC_NM longName="Sequence Number" type="NM"/>
<MSH_CNTN_PNTR longName="Continuation Pointer" type="ST"/>
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<MSH_APP_ACK_TYP longName="Application Acknowledgment Type" type="ID"/>
<MSH_CNTRY_CDE longName="Country Code" type="ID"/>
<MSH_CHAR_SET longName="Character Set" type="ID"/>
<MSH_MSG_LANG longName="Principal Language Of Message" type="CE"/>
<NK1_SET_ID longName="Set ID - NK1" type="SI"/>
<NK1_NME longName="Name" type="XPN"/>
<NK1_RLTNSHP longName="Relationship" type="CE"/>
<NK1_ADDRSS longName="Address" type="XAD"/>
<NK1_PHNE_NM longName="Phone Number" type="XTN"/>
<NK1_BUS_PHNE_NM longName="Business Phone Number" type="XTN"/>
<NK1_CNTCT_RLE longName="Contact Role" type="CE"/>
<NK1_STRT_DTE longName="Start Date" type="DT"/>
<NK1_END_DTE longName="End Date" type="DT"/>
<NK1_KIN_JOB_TITLE longName="Next of Kin / Associated Parties Job Title"
type="ST"/>
<NK1_KIN_JOB_CDE longName="Next of Kin / Associated Parties Job Code/Class"
type="JCC"/>
```

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<NK1_KIN_EMP_NM longName="Next of Kin / Associated Parties Employee Number"
type="CX"/>
<NK1_ORG_NME longName="Organization Name - NK1" type="XON"/>
<NK1_MRTL_STS longName="Marital Status" type="CE"/>
<NK1_SEX longName="Sex" type="IS"/>
<NK1_DOB longName="Date/Time Of Birth" type="TS"/>
<NK1_LVNG_DPNDCY longName="Living Dependency" type="IS"/>
<NK1_AMBLTRY_STS longName="Ambulatory Status" type="IS"/>
<NK1_CTZNSHP longName="Citizenship" type="CE"/>
<NK1_PRM_LANG longName="Primary Language" type="CE"/>
<NK1_LVNG_ARNGMNT longName="Living Arrangement" type="IS"/>
<NK1_PBLCTY_CDE longName="Publicity Code" type="CE"/>
<NK1_PRTCTN_IND longName="Protection Indicator" type="ID"/>
<NK1_STDNT_IND longName="Student Indicator" type="IS"/>
<NK1_RLGN longName="Religion" type="CE"/>
<NK1_MOTH_MDN_NME longName="Mother?s Maiden Name" type="XPN"/>
<NK1_NTNLTY longName="Nationality" type="CE"/>
<NK1_ETHNC_GRP longName="Ethnic Group" type="CE"/>
<NK1_CNTCT_RSN longName="Contact Reason" type="CE"/>
<NK1_CNTCT_PRSN_NME longName="Contact Person?s Name" type="XPN"/>
<NK1_CNTCT_PRSN_NUM longName="Contact Person?s Telephone Number" type="XTN"/>
<NK1_CNTCT_PRSN_ADD longName="Contact Person?s Address" type="XAD"/>
<NK1_KIN_ID longName="Next of Kin/Associated Party?s Identifiers" type="CX"/>
<NK1_JOB_STS longName="Job Status" type="IS"/>
<NK1_RACE longName="Race" type="CE"/>
<NK1_HANDICAP longName="Handicap" type="IS"/>
<NK1_CNTCT_PRSN_SSN longName="Contact Person Social Security Number" type="ST"/>
<NTE_SET_ID longName="Set ID - NTE" type="SI"/>
<NTE_SRC longName="Source of Comment" type="ID"/>
<NTE_CMNT longName="Comment" type="FT"/>
<NTE_CMNT_TYP longName="Comment Type" type="CE"/>
<OBR_SET_ID longName="Set ID - OBR" type="SI"/>
<OBR_PLCR_ORDR_NUM longName="Placer Order Number" type="EI"/>
<OBR_FLLR_ORDR_NUM longName="Filler Order Number" type="EI"/>
<OBR_UNVRSL_SRVCE_ID longName="Universal Service ID" type="CE"/>
<OBR_PRIORITY longName="Priority-OBR" type="ID"/>
<OBR_RQSTD_DATETIME longName="Requested Date/time" type="TS"/>
<OBR_OBSRVTN_DATETIME longName="Observation Date/Time #" type="TS"/>
<OBR_OBSRVTN_END_DATETIME longName="Observation End Date/Time #" type="TS"/>
<OBR_CLLCTN_VLME longName="Collection Volume *" type="CQ"/>
<OBR_CLLCTN_ID longName="Collector Identifier *" type="XCN"/>
<OBR_SPCMN_ACTN_CODE longName="Specimen Action Code *" type="ID"/>
<OBR_DNGR_CODE longName="Danger Code" type="CE"/>
<OBR_RLVNT_CLNCL_INF longName="Relevant Clinical Info." type="ST"/>
<OBR_SPCMEN_RCVD_DATETIME longName="Specimen Received Date/Time *" type="TS"/>
<OBR_SPCMEN_SRC longName="Specimen Source *" type="CM_SPS"/>
<OBR_ORDRNG_PRVDR longName="Ordering Provider" type="XCN"/>
<OBR_ORDR_CLLBCK_PHNE_NUM longName="Order Callback Phone Number" type="XTN"/>
<OBR_PLCR_FLD_1 longName="Placer Field 1" type="ST"/>
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<OBR_PLCR_FLD_2 longName="Placer Field 2" type="ST"/>
<OBR_FLLR_FLD_1 longName="Filler Field 1 +" type="ST"/>
<OBR_FLLR_FLD_2 longName="Filler Field 2 +" type="ST"/>
<OBR_RPRT_DATETIME longName="Results Rpt/Status Chng - Date/Time +" type="TS"/>
<OBR_CHRG_TO_PRCTCE longName="Charge to Practice +" type="CM"/>
<OBR_DGNSTC_SRV_SCT_ID longName="Diagnostic Serv Sect ID" type="ID"/>
<OBR_RSLT_STS longName="Result Status +" type="ID"/>
<OBR_PRNT_RSLT longName="Parent Result +" type="CM_PRL"/>
<OBR_QNTY_TMNG longName="Quantity/Timing" type="TQ"/>
<OBR_RSLT_COPIES_TO longName="Result Copies To" type="XCN"/>
<OBR_PRNT longName="Parent" type="CM"/>
<OBR_TRNSPRTN_MDE longName="Transportation Mode" type="ID"/>
<OBR_RSN_FOR_STDY longName="Reason for Study" type="CE"/>
<OBR_PRNCPL_RSLT_INTRPRTR longName="Principal Result Interpreter +"
type="CM_NDL"/>
<OBR_ASSTNT_RSLT_INTRPRTR longName="Assistant Result Interpreter +"
type="CM_NDL"/>
<OBR_TCHNCN longName="Technician +" type="CM_NDL"/>
<OBR_TRNSCRPTNST longName="Transcriptionist +" type="CM_NDL"/>
<OBR_SCHDLD_DATETIME longName="Scheduled Date/Time +" type="TS"/>
<OBR_NUM_SMPL_CNTNRS longName="Number of Sample Containers *" type="NM"/>
<OBR_TRNSPRT_LGSTCS longName="Transport Logistics of Collected Sample *"
type="CE"/>
<OBR_CLLCTRS_CMMNT longName="Collector?s Comment *" type="CE"/>
<OBR_TRNSPRT_ARRNGMNT_RSPNSBLTY longName="Transport Arrangement Responsibility"
type="CE"/>
<OBR_TRNSPRT_ARRNGD longName="Transport Arranged" type="ID"/>
<OBR_ESCRT_RQRD longName="Escort Required" type="ID"/>
<OBR_PLNND_PATNT_TRNSPRT_CMMNT longName="Planned Patient Transport Comment"
type="CE"/>
<OBX_SET_ID longName="Set ID - OBX" type="SI"/>
<OBX_VALUE_TYP longName="Value Type" type="ID"/>
<OBX_OBSRVTN_ID longName="Observation Identifier" type="CE"/>
<OBX_OBSRVTN_SUB_ID longName="Observation Sub-ID" type="ST"/>
<OBX_OBSRVTN_VALUE longName="Observation Value" type="@OBX_VALUE_TYP"/>
<OBX_UNITS longName="Units" type="CE"/>
<OBX_RFRNCS_RNG longName="References Range" type="ST"/>
<OBX_ABNRML_FLGS longName="Abnormal Flags" type="ID"/>
<OBX_PRBLTY longName="Probability" type="NM"/>
<OBX_NATURE_OF_ABNRML_TST longName="Nature of Abnormal Test" type="ID"/>
<OBX_OBSRV_RSLT_STS longName="Observation Result Status" type="ID"/>
<OBX_DATE_LST_OBS_NRML_VAL longName="Date Last Obs Normal Values" type="TS"/>
<OBX_USR_DFND_ACCSS_CHKS longName="User Defined Access Checks" type="ST"/>
<OBX_OBSV_DATETIME longName="Date/Time of the Observation" type="TS"/>
<OBX_PRDCERS_ID longName="Producer's ID" type="CE"/>
<OBX_RSPNSBLE_OBSRVR longName="Responsible Observer" type="XCN"/>
<OBX_OBSRVTN_MTHD longName="Observation Method" type="CE"/>
<ORC_ORDR_CNTRL longName="Order Control" type="ID"/>
<ORC_PLCR_ORDR_NUM longName="Placer Order Number" type="EI"/>
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<ORC_FLLR_ORDR_NUM longName="Filler Order Number" type="EI"/>
<ORC_PLCR_GRP_NUM longName="Placer Group Number" type="EI"/>
<ORC_ORDR_STS longName="Order Status" type="ID"/>
<ORC_RSPNS_FLG longName="Response Flag" type="ID"/>
<ORC_QNTY_TMNG longName="Quantity/Timing" type="TQ"/>
<ORC_PARENT longName="Parent" type="CM"/>
<ORC_XN_DATETIME longName="Date/Time of Transaction" type="TS"/>
<ORC_ENTRD_BY longName="Entered By" type="XCN"/>
<ORC_VRFD_BY longName="Verified By" type="XCN"/>
<ORC_ORDRNG_PRVDR longName="Ordering Provider" type="XCN"/>
<ORC_ENTRS_LOC longName="Enterer?s Location" type="PL"/>
<ORC_ENTRS_LOC longName="Call Back Phone Number" type="XTN"/>
<ORC_CLL_BCK_PHNE_NUM longName="Order Effective Date/Time" type="TS"/>
<ORC_ORDR_EFF_DATETIME longName="Order Control Code Reason" type="CE"/>
<ORC_ORDR_CNTRL_CODE_RSN longName="Entering Organization" type="CE"/>
<ORC_ENTRNG_ORG longName="Entering Device" type="CE"/>
<ORC_ENTRNG_DVCE longName="Action By" type="XCN"/>
<ORC_ADNVCD_BNFCRY_NTCE_CODE longName="Advanced Beneficiary Notice Code"
type="CE"/>
<ORC_ORD_FAC_NAME longName="Ordering Facility Name" type="XON"/>
<ORC_ORD_FAC_ADD longName="Ordering Facility Address" type="XAD"/>
<ORC_ORD_FAC_PHONE longName="Ordering Facility Phone Number" type="XTN"/>
<ORC_ORD_PROV_ADD longName="Ordering Provider Address" type="XAD"/>
<PD1_LVNG_DPNDCY longName="Living Dependency" type="IS"/>
<PD1_LVNG_ARRNGMNT longName="Living Arrangement" type="IS"/>
<PD1_PATNT_PRM_FAC longName="Patient Primary Facility" type="XON"/>
<PD1_PATNT_PRM_CARE_PRV longName="Patient Primary Care Provider Name "
type="XCN"/>
<PD1_STDNT_IND longName="Student Indicator" type="IS"/>
<PD1_HANDICAP longName="Handicap" type="IS"/>
<PD1_LVNG_WILL longName="Living Will" type="IS"/>
<PD1_ORGN_DNR longName="Organ Donor" type="IS"/>
<PD1_SEPARATE_BILL longName="Separate Bill" type="ID"/>
<PD1_DUP_PATNT longName="Duplicate Patient" type="CX"/>
<PD1_PBLCTY_CDE longName="Publicity Code" type="CE"/>
<PD1_PRTCTN_IND longName="Protection Indicator" type="ID"/>
<PID_SET_ID longName="Set ID - PID" type="SI"/>
<PID_PATNT_ID longName="Patient ID" type="CX"/>
<PID_PATNT_ID_LST longName="Patient Identifier List" type="CX"/>
<PID_ALT_PATNT_ID longName="Alternate Patient ID - PID" type="CX"/>
<PID_PATNT_NAME longName="Patient Name" type="XPN"/>
<PID_MTHR_MDN_NME longName="Mother?s Maiden Name" type="XPN"/>
<PID_DOB longName="Date/Time Of Birth" type="TS"/>
<PID_SEX longName="Sex" type="IS"/>
<PID_ALIAS longName="Patient Alias" type="XPN"/>
<PID_RACE longName="Race" type="CE"/>
<PID_PATNT_ADDRSS longName="Patient Address" type="XAD"/>
<PID_COUNTY_CDE longName="County Code" type="IS"/>
<PID_PHNE_HME longName="Phone Number - Home" type="XTN"/>
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<PID_PHNE_BUS longName="Phone Number - Business" type="XTN"/>
<PID_PRMRY_LANG longName="Primary Language" type="CE"/>
<PID_MRTL_STS longName="Marital Status" type="CE"/>
<PID_RLGN longName="Religion" type="CE"/>
<PID_PATNT_ACC_NM longName="Patient Account Number" type="CX"/>
<PID_SSN_NM longName="SSN Number - Patient" type="ST"/>
<PID_DRVR_LCNS_NM longName="Driver's License Number - Patient" type="DLN"/>
<PID_MTHR_ID longName="Mother's Identifier" type="CX"/>
<PID_ETHNIC_GRP longName="Ethnic Group" type="CE"/>
<PID_BRTH_PLC longName="Birth Place" type="ST"/>
<PID_MLTPL_BRTH_IND longName="Multiple Birth Indicator" type="ID"/>
<PID_BRTH_ORDR longName="Birth Order" type="NM"/>
<PID_CTZNSHP longName="Citizenship" type="CE"/>
<PID_VTRNS_MIL_STS longName="Veterans Military Status" type="CE"/>
<PID_NTNLTY longName="Nationality" type="CE"/>
<PID_PATNT_DTH_DATETIME longName="Patient Death Date and Time" type="TS"/>
<PID_PATNT_DTH_IND longName="Patient Death Indicator" type="ID"/>
<PV1_SET_ID longName="Set ID - PV1" type="SI"/>
<PV1_PATNT_CLSS longName="Patient Class" type="IS"/>
<PV1_ASGND_PATNT_LCTN longName="Assigned Patient Location" type="PL"/>
<PV1_ADMSN_TYP longName="Admission Type" type="IS"/>
<PV1_PREADMT_NUM longName="Preadmit Number" type="CX"/>
<PV1_PRIOR_PATNT_LOC longName="Prior Patient Location" type="PL"/>
<PV1_ATNDNG_DCTR longName="Attending Doctor" type="XCN"/>
<PV1_RFRNG_DCTR longName="Referring Doctor" type="XCN"/>
<PV1_CNSLTNG_DCTR longName="Consulting Doctor" type="XCN"/>
<PV1_HSPTL_SRVCE longName="Hospital Service" type="IS"/>
<PV1_TMP_LOC longName="Temporary Location" type="PL"/>
<PV1_PREADMIT_TST_IND longName="Preadmit Test Indicator" type="IS"/>
<PV1_READMSSN_IND longName="Re-admission Indicator" type="IS"/>
<PV1_ADMNT_SRC longName="Admit Source" type="IS"/>
<PV1_AMBLTRY_STS longName="Ambulatory Status" type="IS"/>
<PV1_VIP_IND longName="VIP Indicator" type="IS"/>
<PV1_ADMTTNG_DCTR longName="Admitting Doctor" type="XCN"/>
<PV1_PATNT_TYP longName="Patient Type" type="IS"/>
<PV1_VST_NUM longName="Visit Number" type="CX"/>
<PV1_FNCL_CLSS longName="Financial Class" type="FC"/>
<PV1_CHRG_PRC_IND longName="Charge Price Indicator" type="IS"/>
<PV1_CRTSY_CODE longName="Courtesy Code" type="IS"/>
<PV1_CRDT_RTNG longName="Credit Rating" type="IS"/>
<PV1_CNTRCT_CODE longName="Contract Code" type="IS"/>
<PV1_CNTRCT_EFFCTV_DTE longName="Contract Effective Date" type="DT"/>
<PV1_CNTRCT_AMMNT longName="Contract Amount" type="NM"/>
<PV1_CNTRCT_PRD longName="Contract Period" type="NM"/>
<PV1_INTRST_CODE longName="Interest Code" type="IS"/>
<PV1_TRNSFR_BAD_DEBT_CODE longName="Transfer to Bad Debt Code" type="IS"/>
<PV1_TRNSFR_BAD_DEBT_DTE longName="Transfer to Bad Debt Date" type="DT"/>
<PV1_BAD_DEBT_AGNCY_CODE longName="Bad Debt Agency Code" type="IS"/>
<PV1_BAD_DEBT_TRNSFR_AMNT longName="Bad Debt Transfer Amount" type="NM"/>
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<PV1_BAD_DEBT_RCVRY_AMNT longName="Bad Debt Recovery Amount" type="NM"/>
<PV1_DLT_ACCNT_IND longName="Delete Account Indicator" type="IS"/>
<PV1_DLT_ACCNT_DTE longName="Delete Account Date" type="DT"/>
<PV1_DSCHRG_DSPSTN longName="Discharge Disposition" type="IS"/>
<PV1_DSCHRG_LOC longName="Discharged to Location" type="CM"/>
<PV1_DIET_TYP longName="Diet Type" type="CE"/>
<PV1_SRVCNG_FAC longName="Servicing Facility" type="IS"/>
<PV1_BED_STS longName="Bed Status" type="IS"/>
<PV1_ACCNT_STS longName="Account Status" type="IS"/>
<PV1_PNDNG_LOC longName="Pending Location" type="PL"/>
<PV1_PRIOR_TMP_LOC longName="Prior Temporary Location" type="PL"/>
<PV1_ADMT_DTE longName="Admit Date/Time" type="TS"/>
<PV1_DSCHRG_DTE longName="Discharge Date/Time" type="TS"/>
<PV1_CRRNT_PATNT_BLNC longName="Current Patient Balance" type="NM"/>
<PV1_TOT_CHRGS longName="Total Charges" type="NM"/>
<PV1_TOT_ADJSMNTS longName="Total Adjustments" type="NM"/>
<PV1_TOT_PYMNTS longName="Total Payments" type="NM"/>
<PV1_ALTRNT_VST_ID longName="Alternate Visit ID" type="CX"/>
<PV1_VST_IND longName="Visit Indicator" type="IS"/>
<PV1_OTHR_HLTHCR_PRVDR longName="Other Healthcare Provider" type="XCN"/>
<PV2_PRIOR_PNDNG_LOC longName="Prior Pending Location" type="PL"/>
<PV2_ACCMMDTN_CODE longName="Accommodation Code" type="CE"/>
<PV2_ADMT_RSN longName="Admit Reason" type="CE"/>
<PV2_TRNSFR_RSN longName="Transfer Reason" type="CE"/>
<PV2_PATNT_VAL longName="Patient Valuables" type="ST"/>
<PV2_PATNT_VAL_LOC longName="Patient Valuables Location" type="ST"/>
<PV2_VST_USR_CODE longName="Visit User Code" type="IS"/>
<PV2_EXPCTD_ADMT_DATETIME longName="Expected Admit Date/Time" type="TS"/>
<PV2_EXPCTD_DSCHRG_DATETIME longName="Expected Discharge Date/Time" type="TS"/>
<PV2_ESTMTD_LNGTH_INPATNT_STAY longName="Estimated Length of Inpatient Stay"
type="NM"/>
<PV2_ACTL_LNGTH_INPATNT_STAY longName="Actual Length of Inpatient Stay"
type="NM"/>
<PV2_VST_DSCRPTN longName="Visit Description" type="ST"/>
<PV2_RFRRL_SRC_CODE longName="Referral Source Code" type="XCN"/>
<PV2_PRVS_SRVC_DTE longName="Previous Service Date" type="DT"/>
<PV2_EMPLYMNT_ILLNSS_RLTD_IND longName="Employment Illness Related Indicator"
type="ID"/>
<PV2_PRG_STS_CODE longName="Purge Status Code" type="IS"/>
<PV2_PRG_STS_DTE longName="Purge Status Date" type="DT"/>
<PV2_SPCL_PRGM_CODE longName="Special Program Code" type="IS"/>
<PV2_RTNTN_IND longName="Retention Indicator" type="ID"/>
<PV2_EXPCTD_NUM_INSRNC_PLNS longName="Expected Number of Insurance Plans"
type="NM"/>
<PV2_VST_PBLCTY_CODE longName="Visit Publicity Code" type="IS"/>
<PV2_VST_PRTCTN_IND longName="Visit Protection Indicator" type="ID"/>
<PV2_CLNC_ORG_NAME longName="Clinic Organization Name" type="XON"/>
<PV2_PATNT_STS_CODE longName="Patient Status Code" type="IS"/>
<PV2_VST_PRTY_CODE longName="Visit Priority Code" type="IS"/>
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<PV2_PRVS_TRTMNT_DTE longName="Previous Treatment Date" type="DT"/>
<PV2_EXPCTD_DSCHRGE_DSPSTN longName="Expected Discharge Disposition" type="IS"/>
<PV2_SGNTRE_ON_FILE_DTE longName="Signature on File Date" type="DT"/>
<PV2_FRST_SMLR_ILLNSS_DTE longName="First Similar Illness Date" type="DT"/>
<PV2_PATNT_CHRGE_ADJSTMNT_CODE longName="Patient Charge Adjustment Code"
type="CE"/>
<PV2_RCRRNG_SRVCE_CODE longName="Recurring Service Code" type="IS"/>
<PV2_BLLNG_MEDIA_CODE longName="Billing Media Code" type="ID"/>
<PV2_EXPCTD_SRGRY_DATETIME longName="Expected Surgery Date " type="TS"/>
<PV2_MLTRY_PRTNRSHP_CODE longName="Military Partnership Code" type="ID"/>
<PV2_MLTRY_NON_AVLBLTY_CODE longName="Military Non-Availability Code"
type="ID"/>
<PV2_NWBRN_BABY_IND longName="Newborn Baby Indicator" type="ID"/>
<PV2_BABY_DTND_IND longName="Baby Detained Indicator" type="ID"/>
<ZLR_ORD_PROVIDER_ADD longName="Ordering Providers Address" type="XAD"/>
<ZLR_ORD_FAC_NAME longName="Ordering Facility Name" type="XON"/>
<ZLR_ORD_FAC_ADD longName="Ordering Facility Address" type="XAD"/>
<ZLR_ORD_FAC_PHONE longName="Ordering Facility Phone" type="XTN"/>
<ZLR_PATIENT_AGE longName="Patient Age" type="SN"/>
<ZLR_NEXT_KIN_NAME longName="Next of Kin/Assoc. Name" type="XPN"/>
<ZLR_NEXT_KIN_RELATION longName="Next of Kin/Assoc. Relationship" type="CE"/>
<ZLR_NEXT_KIN_ADD longName="Next of Kin/Assoc. Address" type="XAD"/>
<ZLR_NEXT_KIN_PHONE longName="Next of Kin/Assoc. Phone" type="XTN"/>
<!-- Batch control segments -->
<FHS_FIELD_SEP longName="Field Sparator" type="ST"/>
<FHS_ENCDNG_CHRS longName="Encoding Characters" type="ST"/>
<FHS_SND_APP longName="Sending Application" type="ST"/>
<FHS_SND_FAC longName="Sending Facility" type="ST"/>
<FHS_RCV_APP longName="Receiving Application" type="ST"/>
<FHS_RCV_FAC longName="Receiving Facility" type="ST"/>
<FHS_DATETIME longName="Creation timestamp" type="TS"/>
<FHS_SECURITY longName="Security" type="ST"/>
<FHS_NAME longName="file name/id/type" type="ST"/>
<FHS_COMMENT longName="Comments" type="ST"/>
<FHS_CONTROL_ID longName="Control ID" type="ST"/>
<FHS_REF_CONTROL_ID longName="Reference file control id" type="ST"/>
<FTS_BATCH_COUNT longName="Batch Count" type="NM"/>
<FTS_COMMENT longName="File trailer Comment" type="ST"/>
<BHS_FIELD_SEP longName="Field Sparator" type="ST"/>
<BHS_ENCDNG_CHRS longName="Encoding Characters" type="ST"/>
<BHS_SND_APP longName="Sending Application" type="ST"/>
<BHS_SND_FAC longName="Sending Facility" type="ST"/>
<BHS_RCV_APP longName="Receiving Application" type="ST"/>
<BHS_RCV_FAC longName="Receiving Facility" type="ST"/>
<BHS_DATETIME longName="Creation timestamp" type="TS"/>
<BHS_SECURITY longName="Security" type="ST"/>
<BHS_NAME longName="Batch name/id/type" type="ST"/>
<BHS_COMMENT longName="Comments" type="ST"/>
<BHS_CONTROL_ID longName="Control ID" type="ST"/>
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<BHS_REF_CONTROL_ID longName="Reference batch control id" type="ST"/>
<BTS_MSG_COUNT longName="Message Count" type="ST"/>
<BTS_COMMENT longName="Batch Trailer Comment" type="ST"/>
<BTS_TOTALS longName="Batch Totals" type="NM"/>
</schema>
```

Data Type Definitions

The following data types require format validation. The notation uses square brackets ([ ]) to define optionality.

Table A-1 Data Types Requiring Format Validation

Name	Description	Format
DT	Date	Must be in the format YYYY[[MM]DD].
NM	Numeric	Mustcontain a number. A sign (+/-) is optional. A decimal point is optional.
SI	Sequence ID	Must contain a non-negative integer.
ST	String	Should contain only printable ASCII characters. Should be less than 200 characters.
TM	Time	Should be in the format HH[MM[SS[.S[S[S[S]]]]]][+/-ZZZZ]
TN	Telephone Number	For use in countries conforming to the United States standard. Should be in the format [NN] [(999)] 999-9999 [X99999] [B99999] [C any text] X99999 – an optional extension number B99999 – an optional beeper number C - any comments.

Table A-1 Data Types Requiring Format Validation (Continued)

Name	Description	Format
TS	Time Stamp	Should be in the format YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]]] [+/-ZZZZ]

Lookup Validation

The following table shows the various fields of segments of Message ORU that require lookup validation.

Table A-2 Message ORU Requiring Validation

Table	HL7/User	Table Number
0001	User	Sex
0002	User	Marital Status
0003	HL7	Event Type
0004	User	Patient Class
0005	User	Race
0006	User	Religion
0007	User	Admission Type
0009	User	Ambulatory Status
0010	User	Physician ID
0018	User	Patient Type
0021	User	Bad debt agency code
0023	User	Admit source
0032	User	Charge/price indicator

Table A-2 Message ORU Requiring Validation (Continued)

Table	HL7/User	Table Number
0038	HL7	Order status
0044	User	Contract code
0045	User	Courtesy code
0046	User	Credit rating
0063	User	Relationship
0064	User	Financial Class
0069	User	Hospital service
0070	HL7	Specimen source codes
0073	User	Interest rate code
0074	HL7	Diagnostic service section ID
0078	HL7	Abnormal flags
0080	HL7	Nature of abnormal testing
0085	HL7	Observation result status codes
0087	User	Preadmit test indicator
0092	User	Re-admission indicator
0099	User	VIP indicator
0104	HL7	Version ID
0105	HL7	Source of comment
0110	User	Transfer to bad debt code
0111	User	Delete account code
0112	User	Discharge disposition
0113	User	Discharged to location
0114	User	Diet type

Table A-2 Message ORU Requiring Validation (Continued)

Table	HL7/User	Table Number
0115	User	Serving facility
0116	User	Bed status
0117	User	Account status
0119	HL7	Order control codes
0121	HL7	Response flag
0123	HL7	Result status
0124	HL7	Transportation mode
0125	HL7	Value type
0129	User	Accommodation code
0130	User	Visit user code
0131	User	Contact role
0136	HL7	Yes/no indicator
0155	HL7	Accept/application acknowledgment conditions
0171	User	Citizenship
0172	User	Veterans Military status
0189	User	Ethnic group
0203	User	Identifier type
0211	HL7	Alternate character sets
0212	User	Nationality
0213	User	Purge status
0215	User	Publicity code
0216	User	Patient status code

Table A-2 Message ORU Requiring Validation (Continued)

Table	HL7/User	Table Number
0217	User	Visit priority code
0218	User	Patient charge adjustment code
0219	User	Recurring service code
0220	User	Living arrangement
0222	User	Contact reason
0223	User	Living dependency
0224	HL7	Transport arranged
0225	HL7	Escort required
0231	User	Student status
0295	User	Handicap
0296	User	Primary language
0311	User	Job status
0315	User	Living will
0316	User	Organ donor
0326	User	Visit indicator
0327	User	Job code/class
0328	User	Employee classification
0339	User	Advanced beneficiary notice code

Sample Conversion

An XML conversion from an HL7 ORU message.

Listing A-4 XML Conversion from an HL7 ORU Message

```
<!-- MSH|^~\&|XRAY||CDB||||ORU^R01|K172|P<cr>
-->
<!-- PID|1|0123456|1||ROBERTSON^JOHN^H|||||||9821111<cr> -->
<!-- OBR|1|X89?1501^OE|78912^RD|71020^CHEST XRAY AP &
-->
<!-- LATERAL|R|198703291530|19873290800|||JBM|N<cr>-->
<!-- OBX|1|CE|71020^RADIOLOGIST'S IMPRESSION|4||^MASS LEFT LOWER
LOBE|1||A||F<cr> -->
<!-- OBX|2|CE|71020|2|^INFILTRATE RIGHT LOWER LOBE|||A||F<cr>-->
<!-- OBX|3|CE|71020|3|^HEART SIZE NORMAL|||N||F<cr> -->
<!-- OBX|4|FT|71020|1|circular density (2 x 2 cm) is seen in the
posterior segment -->
<!-- of the LLL.A second, less well?defined infiltrated circulation
density -->
<!-- is seen in the R mid lung field and appears to cross the minor
-->
<!--fissure#||||||F<cr> -->
<!-- OBX|5|CE|71020||71020^Follow up CXR 1 month||30?45||||F<cr> -->

<!DOCTYPE ORU>
<ORU>
<MSH>
<MSH.FIELD_SEP>|</MSH.FIELD_SEP>
<MSH.ENCDNG_CHRS>^~\&amp;</MSH.ENCDNG_CHRS>
<MSH.SND_APP>XRAY</MSH.SND_APP>
<MSH.RCV_APP>CDB</MSH.RCV_APP>
<MSH.MSG_TYPE>
<CM_MSG.MSG_TYP>ORU</CM_MSG.MSG_TYP>
<CM_MSG.TRGR_TYP>R01</CM_MSG.TRGR_TYP>
</MSH.MSG_TYPE>
<MSH.MSG_CNTRL_ID>K172</MSH.MSG_CNTRL_ID>
<MSH.PRCSNG_ID>P</MSH.PRCSNG_ID>
</MSH>
<PID>
```

```
<PID.SET_ID>1</PID.SET_ID>
<PID.PATNT_ID>0123456?1</PID.PATNT_ID>
<PID.ALT_PATNT_ID_LIST>1</PID.ALT_PATNT_ID_LIST>
<PID.PATNT_NAME>
<PN.FMLY_NME>ROBERTSON</PN.FMLY_NME>
<PN.GVN_NME>JOHN</PN.GVN_NME>
<PN.MDDL_NME>H</PN.MDDL_NME>
</PID.PATNT_NAME>
<PID.COUNTY_CDE>9821111</PID.COUNTY_CDE>
</PID>
<OBR>
<OBR.SET_ID>1</OBR.SET_ID>
<OBR.PLCR_ORDR_NUM>
<EI.ENTY_ID>X89?1501</EI.ENTY_ID>
<EI.NMSPC_ID>OE</EI.NMSPC_ID>
</OBR.PLCR_ORDR_NUM>
<OBR.FLLR_ORDR_NUM>
<EI.ENTY_ID>78912</EI.ENTY_ID>
<EI.NMSPC_ID>RD</EI.NMSPC_ID>
</OBR.FLLR_ORDR_NUM>
<OBR.UNVRSL_SRVCE_ID>
<CE.ID>71020</CE.ID>
<CE.TXT>CHEST XRAY AP &amp;amp; LATERAL</CE.TXT>
</OBR.UNVRSL_SRVCE_ID>
<OBR.PRIORITY>R</OBR.PRIORITY>
<OBR.RQSTD_DATETIME>198703291530</OBR.RQSTD_DATETIME>
<OBR.OBSRVTN_DATETIME>19873290800</OBR.OBSRVTN_DATETIME>
<OBR.CLLCTN_ID>JBM</OBR.CLLCTN_ID>
<OBR.SPCMN_ACTN_CODE>N</OBR.SPCMN_ACTN_CODE>
</OBR>
<OBX>
<OBX.SET_ID>1</OBX.SET_ID>
<OBX.VALUE_TYP>CE</OBX.VALUE_TYP>
<OBX.OBSRVTN_ID>
<CE.ID>71020</CE.ID>
<CE.TXT>RADIOLOGIST'S IMPRESSION</CE.TXT>
</OBX.OBSRVTN_ID>
<OBX.OBSRVTN_SUB_ID>4</OBX.OBSRVTN_SUB_ID>
<OBX.UNITS>
<CE.TXT>MASS LEFT LOWER LOBE</CE.TXT>
</OBX.UNITS>
<OBX.RFRNCS_RNG>1</OBX.RFRNCS_RNG>
<OBX.PRBLTY>A</OBX.PRBLTY>
<OBX.OBSRV_RSLT_STS>F</OBX.OBSRV_RSLT_STS>
```

```
</OBX>
<OBX>
<OBX.SET_ID>2</OBX.SET_ID>
<OBX.VALUE_TYP>CE</OBX.VALUE_TYP>
<OBX.OBSRVTN_ID>
<CE.ID>71020</CE.ID>
</OBX.OBSRVTN_ID>
<OBX.OBSRVTN_SUB_ID>2</OBX.OBSRVTN_SUB_ID>
<OBX.OBSRVTN_VALUE>
<CE.TXT>INFILTRATE RIGHT LOWER LOBE</CE.TXT>
</OBX.OBSRVTN_VALUE>
<OBX.ABNRML_FLGS>A</OBX.ABNRML_FLGS>
<OBX.NATURE_OF_ABNRML_TST>F</OBX.NATURE_OF_ABNRML_TST>
</OBX>
<OBX>
<OBX.SET_ID>3</OBX.SET_ID>
<OBX.VALUE_TYP>CE</OBX.VALUE_TYP>
<OBX.OBSRVTN_ID>
<CE.ID>71020</CE.ID>
</OBX.OBSRVTN_ID>
<OBX.OBSRVTN_SUB_ID>3</OBX.OBSRVTN_SUB_ID>
<OBX.OBSRVTN_VALUE>
<CE.TXT>HEART SIZE NORMAL</CE.TXT>
</OBX.OBSRVTN_VALUE>
<OBX.ABNRML_FLGS>N</OBX.ABNRML_FLGS>
<OBX.NATURE_OF_ABNRML_TST>F</OBX.NATURE_OF_ABNRML_TST>
</OBX>
<OBX>
<OBX.SET_ID>4</OBX.SET_ID>
<OBX.VALUE_TYP>FT</OBX.VALUE_TYP>
<OBX.OBSRVTN_ID>
<CE.ID>71020</CE.ID>
</OBX.OBSRVTN_ID>
<OBX.OBSRVTN_SUB_ID>1</OBX.OBSRVTN_SUB_ID>
<OBX.OBSRVTN_VALUE>
<CE.TXT>circular density (2 x 2 cm) is seen in the posterior segment
of the LLL.  A second, less well defined infiltrated circulation
density is seen in the R mid lung field and appears to cross the minor
fissure#</CE.TXT>
</OBX.OBSRVTN_VALUE>
<OBX.NATURE_OF_ABNRML_TST>F</OBX.NATURE_OF_ABNRML_TST>
</OBX>
<OBX>
<OBX.SET_ID>5</OBX.SET_ID>
```

```
<OBX.VALUE_TYP>CE</OBX.VALUE_TYP>
<OBX.OBSRVTN_ID>
<CE.ID>71020</CE.ID>
</OBX.OBSRVTN_ID>
<OBX.OBSRVTN_VALUE>
<CE.ID>71020</CE.ID>
<CE.TXT>Follow up CXR 1 month</CE.TXT>
</OBX.OBSRVTN_VALUE>
<OBX.RFRNCS_RNG>30?45</OBX.RFRNCS_RNG>
<OBX.OBSRV_RSLT_STS>F</OBX.OBSRV_RSLT_STS>
</OBX>
</ORU>
```

Validation Rules File

The following is a partial rules file that will be used to define the rules of HL7 validation. There are two table lookup methods; one for tables that are defined as part of HL7 and another for user tables that vary from implementation to implementation.

Listing A-5 Rules File

```
<ORU>
<using class="XDHL7Rules">
<rule tag="MSH.FIELD_SEP" method="isString" code="">
<rule tag="MSH.ENCDNG_CHRS" method="isString" code="">
<rule tag="MSH.SND_APP" method="isString" code="">
<rule tag="MSH.SND_FAC" method="isString" code="">
<rule tag="MSH.RCV_APP" method="isString" code="">
<rule tag="MSH.RCV_FAC" method="isString" code="">
<rule tag="MSH.MSG_DATETIME" method="isDateTime" code="">
<rule tag="MSH.SECURITY" method="isString" code="">
<rule tag="MSH.MSG_TYPE" method="inHL7Lookup" code="table=0076">
<rule tag="MSH.MSG_CNTRL_ID" method="isString" code="">
<rule tag="MSH.PRCSNG_ID" method="isString" code="">
<rule tag="MSH.VRSN_ID" method="inHL7Lookup" code="table=0104">
<rule tag="MSH.SQNC_NM" method="isNumeric" code="">
<rule tag="MSH.CNTN_PNTR" method="isString" code="">
<rule tag="MSH.ACCPT_ACK_TYP" method="inUserLookup" code="0155">
```

```
<rule tag="MSH.APP_ACK_TYP" method="inUserLookup" code="0155">
<rule tag="MSH.CNTRY_CDE" method="isString" code="">
<rule tag="MSH.CHAR_SET" method="inUserLookup" code="0211">
<rule tag="MSH.MSG_LANG" method="isString" code="">
<rule tag="MSH.ALT_CHAR_SET" method="isString" code="">
</using>
</ORU>
```

Error Codes

The error codes returned in acknowledgment documents are defined in the following HL7 table 0357.

Table A-3 Error Codes

Code	Meaning
0	Message Accepted
100	Segment sequence error
101	Required field missing
102	Data type error
103	Table value not found
200	Unsupported message type
201	Unsupported event code
202	Unsupported processing id
203	Unsupported version id
204	Unknown key identifier
205	Duplicate key identifier
206	Application record locked

Table A-3 Error Codes

Code	Meaning
207	Application internal error