

Oracle® Healthcare Master Person Index

Standardization Engine Reference

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Preface

The Oracle Healthcare Master Person Index (OHMPI) Standardization Engine works with the OHMPI Match Engine to provide data parsing, data standardization, phonetic encoding, and record matching capabilities for external applications, such as OHMPI applications.

Audience

This document is intended for users of OHMPI applications that require data comparison to evaluate and confirm the possibility of data matches.

Documentation Accessibility

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Related Documents

For more information and instructions for implementing and using a Master Person Index application, see the following documents in the Oracle Healthcare Master Person Index documentation set:

- *Oracle Healthcare Master Person Index Analyzing and Cleansing Data User's Guide*
- *Oracle Healthcare Master Person Index Australia Patient Solution User's Guide*
- *Oracle Healthcare Master Person Index Command Line Reports and Database Management User's Guide*
- *Oracle Healthcare Master Person Index Configuration Guide*
- *Oracle Healthcare Master Person Index Configuration Reference*
- *Oracle Healthcare Master Person Index Data Manager User's Guide*
- *Oracle Healthcare Master Person Index Installation Guide*
- *Oracle Healthcare Master Person Index Loading the Initial Data Set User's Guide*

- *Oracle Healthcare Master Person Index Match Engine Reference*
- *Oracle Healthcare Master Person Index Message Processing Reference*
- *Oracle Healthcare Master Person Index Provider Index User's Guide*
- *Oracle Healthcare Master Person Index Real-time Loader User's Guide*
- *Oracle Healthcare Master Person Index Relationship Management Data Manager User's Guide*
- *Oracle Healthcare Master Person Index Relationship Management REST APIs Reference Guide*
- *Oracle Healthcare Master Person Index Relationship Management User's Guide*
- *Oracle Healthcare Master Person Index Release Notes*
- *Oracle Healthcare Master Person Index Security Guide*
- *Oracle Healthcare Master Person Index Standardization Engine Reference*
- *Oracle Healthcare Master Person Index Third Party Licenses and Notices*
- *Oracle Healthcare Master Person Index United Kingdom Patient Solution User's Guide*
- *Oracle Healthcare Master Person Index United States Patient Solution User's Guide*
- *Oracle Healthcare Master Person Index User's Guide*
- *Oracle Healthcare Master Person Index Working With HPD Profile Application User's Guide*
- *Oracle Healthcare Master Person Index Working With IHE Profiles User's Guide*

Note: These documents are designed to be used together when implementing a master index application.

Finding Information and Patches on My Oracle Support

Your source for the latest information about Oracle Healthcare Master Person Index is Oracle Support's self-service Web site My Oracle Support (formerly MetaLink).

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2. Locate the Search box in the upper right corner of the My Oracle Support page.
3. Click the sources icon to the left of the search box, and then select **Article ID** from the list.
4. Enter the article ID number in the text box.
5. Click the magnifying glass icon to the right of the search box (or press the Enter key) to execute your search.

The Knowledge page displays the results of your search. If the article is found, click the link to view the abstract, text, attachments, and related products.

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- **Product Focus** — On the Knowledge page under Select Product, type part of the product name and the system immediately filters the product list by the letters you have typed. (You do not need to type "Oracle.") Select the product you want from the filtered list and then use other search or browse tools to find the information you need.
- **Advanced Search** — You can specify one or more search criteria, such as source, exact phrase, and related product, to find information. This option is available from the **Advanced** link on almost all pages.

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 - To find a patch by product name, release, and platform, click the **Product or Family** link to enter one or more search criteria.

3. Click **Search** to execute your query. The Patch Search Results page opens.
4. Click the patch ID number. The system displays details about the patch. In addition, you can view the Read Me file before downloading the patch.
5. Click **Download**. Follow the instructions on the screen to download, save, and install the patch files.

Finding Oracle Documentation

The Oracle Web site contains links to all Oracle user and reference documentation. You can view or download a single document or an entire product library.

Finding Oracle Health Sciences Documentation

To get user documentation for Oracle Health Sciences applications, go to the Oracle Health Sciences documentation page at:

<http://www.oracle.com/technetwork/documentation/hsgbu-154445.html>

Note: Always check the Oracle Health Sciences Documentation page to ensure you have the latest updates to the documentation.

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1. Go to the following Web page:

<http://www.oracle.com/technology/documentation/index.html>

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2. Scroll to the product you need and click the link.
3. Click the link for the documentation you need.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Master Person Index Standardization Engine Reference

This chapter provides an overview of the Oracle Healthcare Master Person Index (OHMPI) Standardization Engine and introduces you to standardization concepts.

This chapter includes the following sections:

- [Introducing the OHMPI Standardization Engine](#) on page 1-1
- [Understanding Standardization Concepts](#) on page 1-1

Introducing the OHMPI Standardization Engine

The OHMPI Standardization Engine works together with the OHMPI Match Engine to provide data parsing, data standardization, phonetic encoding, and record matching capabilities for external applications, such as master person index applications. Before records can be compared to evaluate the possibility of a match, the data contained in those records must be normalized and in certain cases standardized and phonetically encoded. Once the data is conditioned, the match engine determines a match weight for each field defined for matching. The standardization engine is built on a flexible framework that allows you to customize the standardization process and extend standardization rules.

The Master Person Index Standardization Engine is designed to work with the master person index applications created by Oracle Healthcare Master Person Index. The standardization engine can also be called from other applications, web services, web applications, and so on. It is highly configurable in the Oracle Healthcare Master Person Index environment and can be used to standardize various types of data. The OHMPI Standardization Engine works in conjunction with the OHMPI Match Engine to improve the quality of your data.

Understanding Standardization Concepts

Data standardization transforms input data into common representations of values to give you a single, consistent view of the data stored in and across organizations. Standardizing the data stored in disparate systems provides a common representation of the data so you can easily and accurately compare data between systems.

Data standardization applies multiple transformations against the data: parsing into individual components, cleansing, normalization, and data typing. These actions help cleanse data to prepare it for matching and searching. Some fields might require all the steps, some just normalization, and other data might only need phonetic encoding that is performed in tandem with standardization. Typically, data is first parsed,

normalized, and then typed using patterns analysis, though some cleansing might be needed prior to parsing.

Standardization can include the following phases.

- [Data Parsing or Reformatting](#) on page 1-2
- [Data Normalization](#) on page 1-2

Phonetic Encoding can also be included to complete the data preparation process for matching.

Data Parsing or Reformatting

If incoming records contain data that is not formatted properly, it must be reformatted before it can be normalized. This process identifies and separates each component of a free-form text field that contains multiple pieces of information. Reformatting can also include removing characters or strings from a field that are not relevant to the data. A good example is standardizing free-form text address fields. If you are comparing or searching on street addresses that are contained in one or more free-form text fields (that is, the street address is contained in one field, apartment number in another, and so on), those fields need to be parsed into their individual components, such as house number, street name, street type, and street direction. Then certain components of the address, such as the street name and type, can be normalized. Field components are also known as tokens, and the process of separating data into its tokens is known as tokenization.

Data Normalization

Normalizing data converts it into a standard or common form. A common use for normalization is to convert nicknames into their standard names, such as converting “Rich” to “Richard” or “Meg” to “Margaret.” Another example is normalizing street address components. For example, both “Dr.” or “Drv” in a street address might be normalized to “Drive.” Normalized values are obtained from lookup tables. Once a field value is normalized, that value can be more accurately compared against values in other records to determine whether they are a match.

Phonetic Encoding

Once data has gone through any necessary reformatting and normalization, it can be phonetically encoded. In a master person index application, phonetic values are generally used in blocking queries in order to obtain all possible matches to an incoming record. They are also used to perform searches from the Master Index Data Manager (MIDM) that allow for misspellings and typographic errors. Typically, first names use Soundex encoding and last names and street names use NYSIIS encoding, but the OHMPI Standardization Engine supports several additional phonetic encoders as well.

Master Person Index Standardization Engine

This chapter provides conceptual information on how the OHMPI Standardization Engine works and standardization and matching process. It also describes the internationalization of the OHMPI Standardization Engine.

This chapter includes the following sections:

- [Learning About the OHMPI Standardization Engine](#) on page 2-1
- [Understanding the OHMPI Standardization and Matching Process](#) on page 2-5
- [Internationalizing the OHMPI Standardization Engine](#) on page 2-6

Learning About the OHMPI Standardization Engine

The OHMPI Standardization Engine uses two frameworks to define standardization logic. One framework is based on a finite state machine (FSM) model and the other is based on patterns defined in configurable dictionaries. In the current implementation, the person names and telephone numbers are processed using the FSM framework, and addresses and business names are processed using the patterns-based framework. The OHMPI Standardization Engine includes several sets of files that define standardization logic for all supported data types. For person data and addresses, one set of standardization files is provided for the following national variants: Australia, France, the United Kingdom, Mexico, the People's Republic of China, Japan, and the United States. You can customize these files to adapt the standardization and matching logic to your specific needs or you can create new data types or variants for even more customized processing. With pluggable standardization sets, you can define custom standardization processing for most types of data.

The following topics provide information about the OHMPI Standardization Engine, the standardization frameworks, and data is standardized:

- [OHMPI Standardization Engine Data Types and Variants](#) on page 2-1
- [OHMPI Standardization Engine Standardization Components](#) on page 2-2
- [Finite State Machine Framework](#) on page 2-2
- [Patterns-based Framework](#) on page 2-4

OHMPI Standardization Engine Data Types and Variants

A data type is the primary kind of data you are processing, such as person names, addresses, business names, automotive parts, and so on. A variant is a subset of a data type that is designed to standardize a specific kind of data. For example, for addresses and names, the variants typically define rules for the different countries in which the data originates. For automotive parts, the variants might be different manufacturers.

Each data type and variant uses its own configuration files to define how fields in incoming records are parsed, standardized, and classified for processing. Data types are sometimes referred to as **standardization types**.

In the default implementation with a master person index application, the engine supports data standardization on the following types of data:

- Person Information (described in [Setting FSM-Based Person Name Configuration](#) on page 3-14)
- Telephone Numbers (described in [Setting FSM-Based Telephone Number Configuration](#) on page 3-21)
- Street Addresses (described in [Setting Patterns-based Address Data Configuration](#) on page 4-1)
- Business Names (described in [Setting Patterns-based Business Name Configuration](#) on page 4-17)

In the default configuration, the standardization engine expects street address and business names to be in free-form text fields that need to be parsed prior to normalization and phonetic encoding. Person and phone information can also be contained in free-form text fields, but these types of information can also be processed if the data is already parsed into its individual components. Each data type requires specific customization to `mefa.xml` in the master person index project. This can be done by modifying the file directly or by using the OHMPI Configuration Editor.

OHMPI Standardization Engine Standardization Components

The OHMPI Standardization Engine breaks down fields into various components during the parsing process. This is known as tokenization. For example, it breaks addresses into floor number, street number, street name, street direction, and so on. Some of these components are similar and might be stored in the same output field. In the default configuration for a master person index application, for example, when the standardization engine finds a house number, rural route number, or PO Box number, the value is stored in the `HouseNumber` database field. You can customize this as needed, as long as any field you specify to store a component is also included in the object structure defined for the master person index application.

The standardization engine uses tokens to determine how to process fields that are defined for normalization or parsing into their individual standardization components. For FSM-based data types, the tokens are defined as output symbols in the process definition files and are referenced in the standardization structures in the Master Person Index Configuration Editor and in `mefa.xml`. The tokens determine how each field is normalized or how a free-form text field is parsed and normalized. For patterns-based data types, the tokens are defined internally in the Java code. The tokens for business names specify which business type key file to use to normalize a specific standardization component. The tokens for addresses determine which database fields store each standardization component and how each component is standardized.

Finite State Machine Framework

A finite state machine (FSM) is composed of one or more states and the transitions between those states. The OHMPI Standardization Engine FSM framework is designed to be highly configurable and can be easily extended with no Java coding. The following sections describe the FSM framework and the configuration files that define FSM-based standardization.

About the Finite State Machine Framework

In an FSM framework, the standardization process is defined as one or more states. In a state, only the input symbols defined for that state are recognized. When one of those symbols is recognized, the following action or transition is based on configurable processing rules. For example, when an input symbol is recognized, it might be preprocessed by removing punctuation, matched against a list of tokens, and then postprocessed by normalizing the input value. Once this has been completed for all input symbols, the standardization engine determines which token is the most likely match.

FSM-based processing includes the following steps:

- **Cleansing** - The entire input string is modified to make sure it is broken down into its individual components correctly.
- **Tokenization** - The input string is broken down into its individual components.
- **Parsing** - The individual field components are processed according to configurable rules. Parsing can include any combination of the following three stages:
 - **Preprocessing** - Each token is cleansed prior to matching to make the value more uniform.
 - **Matching** - The cleansed token is matched against patterns or value lists.
 - **Postprocessing** - The matched token is normalized.

Note: Several parsing sequences might be performed against one field component in order to best match it with a token. Each sequence is carried out until a match is made.

- **Ambiguity Resolution** - Some input strings might match more than one processing rule, so the FSM framework includes a probability-based mechanism for determining the correct state transition.

Using the person data type, for example, first names such as “Bill” and “Will” are normalized to “William,” which is then converted to its phonetic equivalent. Standardization logic is defined in the standardization engine configuration files and in the Master Person Index Configuration Editor or mefa.xml in a master person index project.

FSM-Based Configuration

The FSM-based standardization configuration files are stored in the master person index project and appear in the Standardization Engine node of the project. These files are separated into groups based on the primary data types being processed. Data type groups have further subsets of configuration files based on the variants for each data type. FSM-based data types and variants, such as PersonName and PhoneNumber, include the following configuration file types.

- **Service Definition Files** - Each data type and data type variant is defined by a service definition file. Service **type** files define the fields to be standardized for a data type and service **instance** files define the variant and Java factory class for the variant. Both files are in XML format and should not be modified unless the data type is extended to include more output symbols.
- **Process Definition Files** - These files define the different stages of processing data for the data type or variant. It defines the FSM states, input and output symbols,

patterns, and data cleansing rules. These files use a domain-specific language (DSL) to define how the data fields are processed.

- **Lexicon Files** - The standardization engine uses these files to recognize input data. A lexicon provides a list of possible values for a specific field, and one lexicon file should be defined for each field on which standardization is performed.
- **Normalization Files** - The standardization engine uses these files to convert nonstandard values into a common form. For example, a nickname file provides a list of nicknames along with the common version of each name. For example, "Beth" and "Liz" might both be normalized to "Elizabeth." Each row in the file contains a nickname and its corresponding normalized version separated by a pipe character (|).

Patterns-based Framework

In the patterns-based framework, the standardization process is defined configurable dictionaries and also in the underlying Java code. You can configure several aspects of the standardization process, such as the detectable patterns for each data type, how values are normalized, and how the input string is cleansed and parsed. You can define custom patterns-based data types and variants by creating custom Java packages that define processing.

About the Patterns-based Framework

In the patterns-based framework, individual field components are recognized by the patterns defined for each data type and by information provided in configurable files about how to preprocess, match, and postprocess each field component. The patterns-based framework processes data in the following stages.

- **Parsing** - A free-form text field is separated into its individual components, such as street address information or a business name. This process takes into account logic you can customize, such as token patterns, special characters, and priority weights for patterns.
- **Data-Type Identification** - Look up the different locale-specific data dictionaries to identify related types. In the case of postal address, for example, identify street directions, street name, apartment number, and so on. **Normalization** - Once a field is parsed, individual components of the field are normalized based on the configuration files. This can include changing the input street name to a common form or changing the input business name to its official form.
- **Normalization** - Once a field is parsed, individual components of the field are normalized based on the configuration files. This can include changing the input street name to a common form or changing the input business name to its official form.
- **Patterns-Resolution** - In general, there is more than one pattern for the same input record, and we associated algorithm need to choose the appropriate pattern in the pattern dictionary table.

Using the street address data type, for example, street addresses are parsed into their component parts, such as house numbers, street names, and so on. Certain fields are normalized, such as street name, street type, and street directions. The street name is then phonetically converted. Standardization logic is defined in the standardization engine configuration files and in the Master Person Index Configuration Editor or mefa.xml in a master person index project.

Patterns-based Configuration

The patterns-based standardization configuration files are stored in the master person index project and appear as nodes in the Standardization Engine node of the project. These files are separated into groups based on the primary data types and variants being processed. Patterns-based data types and variants, such as the default Address and Business Name types, use the following configuration file types.

- **Service Definition Files** - Each data type and data type variant is configured by a service definition file. Service type files define the fields to be standardized for a data type, and service instance definition files define the variant and Java factory class for the variant. Both files are in XML format. These files should not be modified.
- **Category Files** - The standardization engine uses category files when processing business names. These files list common values for certain types of data, such as industries and organizations for business names. Category files also define standardized versions of each term or classify the terms into different categories, and some files perform both functions. When processing address files, category files named **clues files** are used.
- **Clues Files** - The standardization engine uses clues files when processing address data types. These files list general terms used in street address fields, define standardized versions of each term, and classify the terms into various component types using predefined address tokens. These files are used by the standardization engine to determine how to parse a street address into its various components. Clues files provide clues in the form of tokens to help the engine recognize the component type of certain values in the input fields.
- **Patterns Files** - The patterns files specify how incoming data should be interpreted for standardization based on the format, or pattern, of the data. These files are used only for processing data contained in free-form text fields that must be parsed prior to matching (such as street address fields or business names). Patterns files list possible input data patterns, which are encoded in the form of tokens. Each token signifies a specific component of the free-form text field. For example, in a street address field, the house number is identified by one token, the street name by another, and so on. Patterns files also define the format of the output fields for each input pattern.
- **Key Type Files** - For business name processing, the standardization engine refers to a number of key type files for processing data. These files generally define standard versions of terms commonly found in business names and some classify these terms into various components or industries. These files are used by the standardization engine to determine how to parse a business name into its different components and to recognize the component type of certain values in the input fields.
- **Reference Files** - Reference files define general terms that appear in input fields for each data type. Some reference files define terms to ignore and some define terms that indicate the business name is continuing. For example, in business name processing “and” is defined as a joining term. This helps the standardization engine to recognize that the primary business name in “Martin and Sons, Inc.” is “Martin and Sons” instead of just “Martin.” Reference files can also define characters to be ignored by the standardization engine.

Understanding the OHMPI Standardization and Matching Process

In a default Oracle Healthcare Master Person Index implementation, the master person index application uses the OHMPI Match Engine and the OHMPI Standardization

Engine to cleanse data in real time. The standardization engine uses configurable pattern-matching logic to identify data and reformat it into a standardized form. The match engine uses a matching algorithm with a proven methodology to process and weight records in the master person index database. By incorporating both standardization and matching capabilities, you can condition data prior to matching. You can also use these capabilities to review legacy data prior to loading it into the database. This review helps you determine data anomalies, invalid or default values, and missing fields.

In a master person index application, both matching and standardization occur when two records are analyzed for the probability of a match. Before matching, certain fields are normalized, parsed, or converted into their phonetic values if necessary. The match fields are then analyzed and weighted according to the rules defined in a match configuration file. The weights for each field are combined to determine the overall matching weight for the two records. After these steps are complete, survivorship is determined by the master person index application based on how the overall matching weight compares to the duplicate and match thresholds of the master person index application.

1. In a master person index application, the standardization and matching process includes the following steps:
2. The master person index application receives an incoming record.
3. The OHMPI Standardization Engine standardizes and/or normalizes the fields. These fields are defined in `mefa.xml` and the rules for standardization are defined in the standardization engine configuration files.
4. The master person index application queries the database for a candidate selection pool (records that are possible matches) using the blocking query specified in `master.xml`. If the blocking query uses standardized or phonetic fields, the criteria values are obtained from the database.
5. For each possible match, the master person index application creates a match string (based on the match columns in `mefa.xml`) and sends the string to the OHMPI Match Engine.
6. The OHMPI Match Engine checks the incoming record against each possible match, producing a matching weight for each. Matching is performed using the weighting rules defined in the match configuration file.

Internationalizing the OHMPI Standardization Engine

By default, the OHMPI Standardization Engine is configured for addresses and names originating from Australia, France, Great Britain, Mexico, the People's Republic of China, and the United States, and for telephone numbers and business names of any origin. Each national variant for each data type uses a specific subset of configuration files. In addition, you can define custom national variants for the standardization engine to support addresses and names from other countries and to support other data types. You can process with your data using the standardization files for a single variant or you can use multiple variants depending on how the master person index application is configured.

Finite State Machine Framework Configuration

This chapter provides conceptual information about the Finite State Machine (FSM) framework configuration. It also provides data and examples for you to use when you set up FSM-based person name and FSM-based telephone number configuration.

This chapter includes the following sections:

- [Learning About the FSM Framework Configuration](#) on page 3-1
- [Setting FSM-Based Person Name Configuration](#) on page 3-14
- [Setting FSM-Based Telephone Number Configuration](#) on page 3-21

Learning About the FSM Framework Configuration

In the FSM framework, the state model definition, along with all the token processing logic, is provided in configuration files in XML format. In addition, lexicon and normalization files define logic used by the OHMPI Standardization Engine to recognize and normalize specific values for each data type or variant. The standardization configuration files for the OHMPI Standardization Engine must follow certain rules for formatting and interdependencies. The following topics provide an overview of the types of configuration files provided for standardization.

The configuration of the finite state machine (FSM) includes defining the various states, transitions between those states, and any actions to perform during each state. Each instance of the FSM begins in the **start** state. In each state, the standardization engine looks for the next token (or **input symbol**), optionally performs certain actions against the token, determines the potential output symbols, and then uses probability-based logic to determine the output symbol to generate for the state and how to transition to the next state. Within each state, only the input symbols defined for that state are recognized. When an input symbol is recognized, the processing defined for that symbol is carried out and the transition to the next state occurs. Note that some input symbols might trigger a transition back to the current state. Once the standardization engine does not recognize any input symbols, the FSM reaches a terminal state from which no further transitions are made.

You can define specialized processing rules for each input symbol in the state model. These rules include cleansing and data transformation logic, such as converting data to uppercase, removing punctuation, comparing the input value against a list of values, and so on. Both the state model and the processing rules are defined in the process definition file, `standardizer.xml`. The lists that you can use to compare and normalize values for each input symbol are contained in lexicon and normalization files.

The configuration files that configure the standardization engine are stored in the master person index project and appear as nodes in the Standardization Engine node of the project. The standardization files are separated into subsets that are each unique

to a specific data type, which are further grouped into variants on those data types. You can define additional standardization file subsets to create new variants or even create new data types, such as automotive parts, inventory items, and so on.

The following topics provide information about the files you can configure or create to customize how your data is standardized:

- [Process Definition File](#) on page 3-2
- [Lexicon Files](#) on page 3-12
- [Normalization Files](#) on page 3-13

Process Definition File

The process definition file (`standardizer.xml`) is the primary configuration file for standardization. It defines the state model, input and output symbol definitions, preprocessing and postprocessing rules, and normalization rules for any type of standardization. Using a domain-specific markup language, you can configure any type of standardization without having to code a new Java package. Each process definition file defines the different stages of processing data for one data type or variant. The process definition file is stored in the resource folder under the data type or variant it defines.

The process definition file is divided into six primary sections, which are described in the following sections:

- [Standardization State Definitions](#) on page 3-2
- [Input Symbol Definitions](#) on page 3-4
- [Output Symbol Definitions](#) on page 3-5
- [Data Cleansing Definitions](#) on page 3-6
- [Data Normalization Definitions](#) on page 3-7
- [Standardization Processing Rules Reference](#) on page 3-8

The processing flow is defined in the state definitions. The input symbol definitions specify the token preprocessing, matching, and postprocessing logic. This is the logic carried out for each input token in a given state. The output symbols define the output for each state. The data cleansing definitions specify any transformations made to the input string prior to tokenization. Normalization definitions are used for data that does not need to be tokenized, but only needs to be normalized and optionally phonetically encoded. For example, if the input text provides the first name in its own field, the middle name in its own field, and so on, then only the normalization definitions are used to standardize the data. The standardization processing rules can be used in all sections except the standardization state definitions.

Standardization State Definitions

An FSM framework is defined by its different states and transitions between states. Each FSM begins with a start state when it receives an input string. The first recognized input symbol in the input string determines the next state based on customizable rules defined in the state model section of `standardizer.xml`. The next recognized input symbol determines the transition to the next state. This continues until no symbols are recognized and the termination state is reached.

Below is an excerpt from the state definitions for the `PersonName` data type. In this state, the first name has been processed and the standardization engine is looking for one of the following: a first name (indicating a middle name), a last name, an

abbreviation (indicating a middle initial), a conjunction, or a nickname. A probability is given for each of these symbols indicating how likely it is to be the next token.

```
<stateModel name="start">
  <when inputSymbol="salutation" nextState="salutation"
    outputSymbol="salutation" probability=".15"/>
  <when inputSymbol="givenName" nextState="headingFirstName"
    outputSymbol="firstName" probability=".6"/>
  <when inputSymbol="abbreviation" nextState="headingFirstName"
    outputSymbol="firstName" probability=".15"/>
  <when inputSymbol="surname" nextState="trailingLastName"
    outputSymbol="lastName" probability=".1"/>
  <state name="headingFirstName">
    <when inputSymbol="givenName" nextState="headingMiddleName"
      outputSymbol="middleName" probability=".4"/>
    <when inputSymbol="surname" nextState="headingLastName"
      outputSymbol="lastName" probability=".3"/>
    <when inputSymbol="abbreviation" nextState="headingMiddleName"
      outputSymbol="middleName" probability=".1"/>
    <when inputSymbol="conjunction" nextState="headingFirstName"
      outputSymbol="conjunction" probability=".1"/>
    <when inputSymbol="nickname" nextState="firstNickname"
      outputSymbol="nickname" probability=".1"/>
  </state>
  ...
</stateModel>
```

The following table lists and describes the XML elements and attributes for the standardization state definitions.

Element	Attribute	Description
stateModel		The primary container element for the state model that includes the definitions for each state in the FSM. This element contains a series of when elements as described below to define the transitions from the start element to any of the other states. It also contains a series of state elements that define the remaining FSM states.
	name	The name of start state (by default, "start").
state		A definition for one state in the FSM (not including the start state). Each state element contains a series of when elements and attributes as described above to define the processing flow.
	name	The name of the state. The names defined here are referenced in the nextState attributes described below to specify the next state.
when		A statement defining which state to transition to and which symbol to output when a specific input symbol is recognized in each state. These elements define the possible transitions from one state to another.
	inputSymbol	The name of an input symbol that might occur next in the input string. This must match one of the input symbols defined later in the file. For more information about input symbols and their processing logic, see Input Symbol Definitions.

Element	Attribute	Description
	nextState	The name of the next state to transition to when the specified input symbol is recognized. This must match the name of one of the states defined in the state model section.
	outputSymbol	The name of the symbol that the current state produces for when processing is complete for the state based on the input symbol. Not all transitions have an output symbol. This must match one of the output symbols defined later in the file. For more information, see Output Symbol Definitions
	probability	The probability that the given input symbol is actually the next symbol in the input string. Probabilities are indicated by a decimal between and including 1 and 0. All probabilities for a given state must add up to 1. If a state definition includes the eof element described below, all probabilities including the eof probability must add up to 1.
eof	probability	The probability that the FSM has reached the end of the input string in the current state. Probabilities are indicated by a decimal between and including 1 and 0. The sum of this probability and all other probabilities for a given state must be 1.

Input Symbol Definitions

The input symbol definitions name and define processing logic for each input symbol recognized by the states. For each state, each possible input symbol is tried according to the rules defined here, and then the probability that it is the next token is assessed. Each input symbol might be subject to preprocessing, token matching, and postprocessing. Preprocessing can include removing punctuation or other regular expression substitutions. The value can then be matched against values in the lexicon file or against regular expressions. If the value matches, it can then be normalized based on the specified normalization file or on pattern replacement. One input symbol can have multiple preprocessing, matching, and postprocessing iterations to go through. If there are multiple iterations, each is carried out in turn until a match is found. All of these steps are optional.

Below is an excerpt from the input symbol definitions for PersonName processing. This excerpt processes the salutation portion of the input string by first removing periods, then comparing the value against the entries in the salutation.txt file, and finally normalizing the matched value based on the corresponding entry in the salutationNormalization.txt file. For example, if the value to process is "Mr.", it is first changed to "Mr" and then matched against a list of salutations before it is converted to "Mister" based on the entry in the normalization file.

```
<inputSymbol name="salutation">
  <matchers>
    <matcher>
      <preProcessing>
        <replaceAll regex="\. " replacement="" />
      </preProcessing>
      <lexicon resource="salutation.txt" />
      <postProcessing>
        <dictionary resource="salutationNormalization.txt" separator="\" />
      </postProcessing>
    </matcher>
```

```

    </matchers>
</inputSymbol>

```

The following table lists and describes the XML elements and attributes for the input symbol definitions.

Element	Attribute	Description
inputSymbol		A container element for the processing logic for one input symbol.
	name	The name of the input symbol against which the following logic applies.
matchers		A list of processing definitions, each of which define one preprocessing, matching, and postprocess sequence. Not all definitions include all three steps.
matcher		A processing definition for one sequence of preprocessing, matching, and postprocessing. A processing definition might contain only one or any combination of the three steps.
	factor	A factor to apply to the probability specified for the input symbol in the state definition. For example, if the state definition probability is 0.4 and this factor is 0.25, then the probability for this matching sequence is 0.1. Only define this attribute when the probability for this matching sequence is very low.
preProcessing		A container element for the preprocessing rules to be carried out against an input symbol. For more information about the rules you can use, see Standardization Processing Rules Reference on page 3-8.
lexicon	resource	The name of the lexicon file containing the list of values to match the input symbol against. Note: You can also match against patterns or regular expressions. For more information, see matchAllPatterns and pattern in Standardization Processing Rules Reference on page 3-8.
postProcessing		A container element for the postprocessing rules to be carried out against an input symbol that has been matched. For more information about the rules you can use, see Standardization Processing Rules Reference on page 3-8.

Output Symbol Definitions

The output symbol definitions name each output symbol that can be produced by the defined states. This section can define additional processing for output symbols using the rules described in [Standardization Processing Rules Reference](#) on page 3-8. Each output symbol defined in the state model definitions must match a value defined here. Below is an excerpt from the output symbol definitions for PersonName processing.

```

<outputSymbols>
  <outputSymbol name="salutation"/>
  <outputSymbol name="firstName"/>
  <outputSymbol name="middleName"/>

```

```

    <outputSymbol name="nickname" />
    <outputSymbol name="lastName" />
    <outputSymbol name="generation" />
    <outputSymbol name="title" />
    <outputSymbol name="conjunction" />
</outputSymbols>

```

The following table lists and describes the XML elements and attributes for the output symbol definitions.

Element	Attribute	Description
outputSymbols		A list of output symbols for each processing state.
outputSymbol		A definition for one output symbol.
	name	The name of the output symbol
occurrenceConcatenator		An optional class to specify the character that separates contiguous occurrences of the same output symbol. For example, this is used in the PhoneNumber data type to concatenate phone number components that are separated by dashes. Components are concatenated using blanks.
	class	The name of the occurrence concatenator class. One concatenator class is predefined.
property		A parameter for the occurrence concatenator class. For the default class, the parameter specifies a separator character.
	name	The name of the parameter. For the default class, the name is "separator".
	value	The parameter value.
tokenConcatenator		An optional class to specify the character that separates non-contiguous occurrences of the same output symbol. For example, this is used in the PhoneNumber data type to concatenate phone number components.
	class	The name of the token concatenator class. one concatenator class is predefined.
property		A parameter for the token concatenator class. For the default class, the parameter specifies a separator character.
	name	The name of the parameter. For the default class, the name is "separator".
	value	The value of the parameter.

Data Cleansing Definitions

You can define cleansing rules to transform the input data prior to tokenization to make the input record uniform and ensure the data is correctly separated into its individual components. This standardization step is optional.

Common data transformations include the following:

- Converting a string to all uppercase.
- Trimming leading and trailing white space.

- Converting multiple spaces in the middle of a string to one space.
- Transliterating accent characters or diacritical marks.
- Adding a space on either side of extra characters (to help the tokenizer recognize them).
- Removing extraneous content.
- Fixing common typographical errors.

The cleansing rules are defined within a cleanser element in the process definition file. You can use any of the rules defined in [Standardization Processing Rules Reference](#) on page 3-8 to cleanse the data. Cleansing attributes use regular expressions to define values to find and replace.

The following excerpt from the PhoneNumber data type does the following to the input string prior to processing:

- Converts all characters to upper case.
- Replaces the specified input patterns with new patterns.
- Removes white space at the beginning and end of the string and concatenates multiple consecutive spaces into one space.

```
<cleanser>
  <uppercase/>
  <replaceAll regex="([0-9]{3})([0-9]{3})([0-9]{4})" replacement="($1)$2-$3"/>
  <replaceAll regex="([-(),)]" replacement=" $1 "/>
  <replaceAll regex="\+(\d+) -" replacement="+$1-"/>
  <replaceAll regex="E?X[A-Z]*[. #]? \s*([0-9]+)" replacement="X $1"/>
  <normalizeSpace/>
</cleanser>
```

Data Normalization Definitions

If the data you are standardizing does not need to be parsed, but does require normalization, you can define data normalization rules to be used instead of the state model defined earlier in the process definition file. These rules would be used in the case of person names where the field components are already contained in separate fields and do not need to be parsed. In this case, the standardization engine processes one field at a time according to the rules defined in the normalizer section of standardizer.xml. In this section, you can define preprocessing rules to be applied to the fields prior to normalization.

Below is an excerpt from the PersonName data type. These rules convert the input string to all uppercase, and then processes the FirstName and MiddleName fields based on the givenName input symbol and processes the LastName field based on the surname input symbol.

```
<normalizer>
  <preProcessing>
    <uppercase/>
  </preProcessing>
  <for field="FirstName" use="givenName"/>
  <for field="MiddleName" use="givenName"/>
  <for field="LastName" use="surname"/>
</normalizer>
```

The following table lists and describes the XML elements and attributes for the normalization definitions.

Element	Attribute	Description
normalizer		A container element for the normalization rules to use when field components do not require parsing, but do require normalization.
preProcessing		A container element for any preprocessing rules to apply to the input strings prior to normalization. For more information about preprocessing rules, see Standardization Processing Rules Reference.
for		The input symbol to use for a given field. This is defined in the following attributes.
	field	The name of a field to be normalized.
	use	The name of the input symbol to associate with the field. The processing logic defined for the input symbol earlier in the file is used to normalize the data contained in that field.

Standardization Processing Rules Reference

The OHMPI Standardization Engine provides several matching and transformation rules for input values and patterns. You can add or modify any of these rules in the existing process definition files (standardizer.xml). Several of these rules use regular expressions to define patterns and values. See the Javadoc for `java.util.regex` for more information about regular expressions.

The available rules include the following:

- [dictionary](#) on page 3-8
- [fixedString](#) on page 3-9
- [lexicon](#) on page 3-9
- [normalizeSpace](#) on page 3-10
- [pattern](#) on page 3-10
- [replace](#) on page 3-11
- [replaceAll](#) on page 3-11
- [transliterate](#) on page 3-12
- [uppercase](#) on page 3-12

dictionary

This rule checks the input value against a list of values in the specified normalization file, and, if the value is found, converts the input value to its normalized value. This is generally used for postprocessing but can also be used for preprocessing tokens. The normalization files are located in the same directory as the process definition file (the instance folder for the data type or variant).

The syntax for dictionary is:

```
<dictionary resource="file_name" separator="delimiter"/>
```

The parameters for dictionary are:

- `resource` - The name of the normalization file to use to look up the input value and determine the normalized value.

- separator - The character used in the normalization file to separate the input value entries from the normalized versions. The default normalization files all use a pipe (|) as a separator.

Example 3-1 Sample dictionary Rule

The following sample checks the input value against the list in the first column of the givenNameNormalization.txt file, which uses a pipe symbol (|) to separate the input value from its normalized version. When a value is matched, the input value is converted to its normalization version.

```
<dictionary resource="givenNameNormalization.txt" separator="\|"/>
```

fixedString

This rule checks the input value against a fixed value. This is generally used for the token matching step for input symbol processing. You can define a list of fixed strings for an input symbol by enclosing multiple fixedString elements within a fixedStrings element. The syntax for fixedString is:

```
<fixedString>string</fixedString>
```

The parameter for fixedString is:

- string - The fixed value to compare the input value against.

Example 3-2 Sample fixedString Rules

The following sample matches the input value against "AND", "OR" and "AND/OR" which are fixed values. If one of the fixed values matches the input string, processing is continued for that matcher definition. If no fixed values match the input string, processing is stopped for that matcher definition and the next matcher definition is processed (if one exists).

```
<fixedStrings>
  <fixedString>AND</fixedString>
  <fixedString>OR</fixedString>
  <fixedString>AND/OR</fixedString>
</fixedStrings>
```

lexicon

This rule checks the input value against a list of values in the specified lexicon file. This is generally used for token matching. The lexicon files are located in the same directory as the process definition file (the instance folder for the data type or variant).

The syntax for lexicon is:

```
<lexicon resource="file_name"/>
```

The parameter for lexicon is:

- resource - The name of the lexicon file to use to look up the input value to ensure correct tokenization.

Example 3-3 Sample lexicon Rule

The following sample checks the input value against the list in the givenName.txt file. When a value is matched, the standardization engine continues to the postprocessing phase if one is defined.

```
<lexicon resource="givenName.txt"/>
```

normalizeSpace

This rule removes leading and trailing white space from a string and changes multiple spaces in the middle of a string to a single space. The syntax for `normalizeSpace` is:

```
<normalizeSpace/>
```

Example 3-4 Sample normalizeSpace Rule

The following sample removes the leading and trailing white space from a last name field prior to checking the input value against the `surnames.txt` file.

```
<matcher>
  <preProcessing>
    <normalizeSpace/>
  </preProcessing>
  <lexicon resource="surnames.txt"/>
</matcher>
```

pattern

This rule checks the input value against a specific regular expression to see if the patterns match. You can define a sequence of patterns by including them all in order in a `matchAllPatterns` element. You can also specify sub-patterns to exclude. The syntax for `pattern` is:

```
<pattern regex="regex_pattern"/>
```

The parameter for `pattern` is:

- `regex` - A regular expression to validate the input value against. See the Javadocs for `java.util.regex` for more information.

The `pattern` rule can be further customized by adding `exceptFor` rules that define patterns to exclude in the matching process. The syntax for `exceptFor` is:

```
<pattern regex="regex_pattern"/>
  <exceptFor regex="regex_pattern"/>
</pattern>
```

The parameter for `exceptFor` is:

- `regex` - A regular expression to exclude from the pattern match. See the Javadocs for `java.util.regex` for more information.

Example 3-5 Sample pattern Rule

The following sample checks the input value against the sequence of patterns to see if the input value might be an area code. These rules specify a pattern that matches three digits contained in parentheses, such as (310).

```
<matchAllPatterns>
  <pattern regex="regex="\("/>
  <pattern regex="regex="\[0-9]{3}"/>
  <pattern regex="regex="\)/>
</matchAllPatterns>
```

The following sample checks the input value against the sequence of patterns to see if the input value might be an area code. These rules specify a pattern that matches three digits contained in parentheses, such as (310).

```
<pattern regex="[A-Z]{3}">
  <exceptFor regex="regex="THE"/>
  <exceptFor regex="regex="AND"/>
```

```
</matchAllPatterns>
```

Example 3-6 Sample pattern Rule

The following sample checks the input value against the sequence of patterns to see if the input value might be an area code. These rules specify a pattern that matches three digits contained in parentheses, such as (310).

```
<matchAllPatterns>
  <pattern regex="regex="\("/>
  <pattern regex="regex="\[0-9]{3}" />
  <pattern regex="regex="\" />
</matchAllPatterns>
```

The following sample checks the input value to see if its pattern is a series of three letters excluding THE and AND.

```
<pattern regex="[A-Z]{3}">
  <exceptFor regex="regex="THE" />
  <exceptFor regex="regex="AND" />
</matchAllPatterns>
```

replace

This rule checks the input value for a specific pattern. If the pattern is found, it is replaced by a new pattern. This rule only replaces the first instance it finds of the pattern. The syntax for replace is:

```
<replace regex="regex_pattern" replacement="regex_pattern"/>
```

The parameters for replace are:

- `regex` - A regular expression that, if found in the input string, is converted to the replacement expression.
- `replacement` - The regular expression that replaces the expression specified by the `regex` parameter.

Example 3-7 Sample replace Rule

The following sample tries to match the input value against "ST.". If a match is found, the standardization engine replaces the value with "SAINT."

```
<replace regex="ST\." replacement="SAINT"/>
```

replaceAll

This rule checks the input value for a specific pattern. If the pattern is found, all instances are replaced by a new pattern. The syntax for replaceAll is:

```
<replaceAll regex="regex_pattern" replacement="regex_pattern"/>
```

The parameters for replaceAll are:

- `regex` - A regular expression that, if found in the input string, is converted to the replacement expression.
- `replacement` - The regular expression that replaces the expression specified by the `regex` parameter.

Example 3-8 Sample replaceAll Rule

The following sample finds all periods in the input value and converts them to

```
blanks.
    <replaceAll regex="\." replacement="" />
```

transliterate

This rule converts the specified characters in the input string to a new set of characters, typically converting from one alphabet to another by adding or removing diacritical marks. The syntax for transliterate is:

```
<transliterate from="existing_char" to="new_char" />
```

The parameters for transliterate are:

- from - The characters that exist in the input string that need to be transliterated.
- to - The characters that will replace the above characters.

Example 3–9 Sample transliterate Rule

The following sample converts lower case vowels with acute accents to vowels with no accents.

```
<transliterate from="áéíóú" to="aeiou" />
```

uppercase

This rule converts all characters in the input string to upper case. The rule does not take any parameters. The syntax for uppercase is:

```
<uppercase />
```

Example 3–10 Sample uppercase Rule

The following sample converts the entire input string into uppercase prior to doing any pattern or value replacements. Since this is defined in the cleanser section, this is performed prior to tokenization.

```
<cleanser>
    <uppercase />
    <replaceAll regex="\." replacement="." />
    <replaceAll regex="AND / OR" replacement="AND/OR" />
    ...
</cleanser>
```

Lexicon Files

Lexicon files list the possible values for a specific field that the standardization engine uses to recognize input data. A lexicon file can be defined for each field on which standardization is performed. These files are referenced from the process definition file when defining matching or processing rules. The lexicon files are located in the resource folder for the data type or variant from which they are referenced.

Lexicon files are simply text files with a single column that lists the possible field values. They are typically given the same name as the token type, or standardization component, that they define. For example, the lexicon files for first and last names are givenNames.txt and surnames.txt. You can modify these files as needed to suit your data requirements and you can create new lexicon files to reference from the process definition file.

Below is an excerpt of the given names lexicon file:

```
ALIA
ALICA
ALICAI
ALICE
ALICEMARIE
ALICEN
ALICIA
ALICJA
ALID
ALIDA
ALIHAN
ALINA
ALINE
ALIS
ALISA
ALISE
ALISHA
ALISHIA
ALISIA
ALISON
```

Normalization Files

Normalization files list nonstandard values for a field along with their corresponding normalized value. The standardization engine uses these files to convert nonstandard values into a standard form. These files are referenced from the process definition file when defining normalization rules. The normalization files are located in the resource folder for the data type or variant from which they are referenced.

The most common example of normalization is a nickname file that provides a list of nicknames along with the standard version of each name. For example, “Beth” and “Liz” might both be standardized to “Elizabeth.” Each row in the file contains a nickname and its corresponding standardized version separated by a pipe character (|). You can modify these files as needed to suit your data processing needs, or you can create new normalization files to reference from the process definition file.

Below is an excerpt of the given names normalization file:

```
BEV|BEVERLY
BIANCA|BLANCHE
BILLIE|WILLIAM
BILLYE|WILLIAM
BILLY|WILLIAM
BILL|WILLIAM
BIRGIT|BRIDGET
BLANCA|BLANCHE
BLANCH|BLANCHE
BOBBIE|ROBERT
BOBBI|ROBERT
BOBBYE|ROBERT
BOBBY|ROBERT
BOB|ROBERT
BONNY|BONNIE
BRADLY|BRADLEY
```

Setting FSM-Based Person Name Configuration

By default, person name data is standardized using the finite state machine (FSM) framework. Processing person data might involve parsing free-form data fields, but normally involves normalizing and phonetically encoding certain fields prior to matching. The following topics describe the default configuration that defines person processing logic and provide information about modifying mefa.xml in a master person index application for processing person data.

- [Person Name Standardization Overview](#) on page 3-14
- [Person Name Standardization Components](#) on page 3-14
- [Person Name Standardization Files](#) on page 3-15
- [Person Name Standardization and Oracle Healthcare Master Person Index](#) on page 3-16

Person Name Standardization Overview

Processing data with the PersonName data type includes standardizing and matching a person's demographic information. The OHMPI Standardization Engine can normalize or standardize values for person data. These values are needed for accurate searching and matching on person data. Several configuration files designed specifically to handle person data are included to provide processing logic for the standardization and phonetic encoding process. The Master Person Index Standardization Engine can phonetically encode any field you specify.

In addition, when processing person information, you might want to standardize addresses to enable searching against address information. This requires working with the address configuration files described in [Chapter 4, "Patterns-based Address Data Configuration."](#)

Person Name Standardization Components

Standardization engines use tokens to determine how each field is standardized into its individual field components and to determine how to normalize a field value. Tokens also identify the field components to external applications like a master person index application. The following table lists each token generated by the OHMPI Standardization Engine for person data along with the standardization component they represent. These correspond to the output symbols in the process definition file and to the output fields listed in the service type definition file. For names, you can only specify the predefined field IDs that are listed in this table unless you customize an existing variant or create a new one.

Token	Description
firstName	Represents a first name field.
generation	Represents a field containing generational information, such as Junior, II, or 3rd.
lastName	Represents a last name field.
middleName	Represents a middle name field.
nickname	Represents a nickname field.
salutation	Represents a field containing prefix information for a name, such as Mr., Miss, or Mrs.

Token	Description
title	Represents a field containing a title, such as Doctor, Reverend, or Professor.

Person Name Standardization Files

Several configuration files are used to define standardization logic for processing person names. You can customize any of the configuration files described in this section to fit your processing and standardization requirements for person data. There are three types of standardization files for person data: process definition, lexicon, and normalization. Seven default variants on the PersonName data type are provided that are specialized for standardizing data from France, Australia, Mexico, the United Kingdom, the People's Republic of China, Japan, or the United States. In a master person index project, these files appear under PersonName in the Standardization Engine node. Files for each variant appear within sub-folders of PersonName and each corresponds to a specific national variant.

You can customize these files to add entries of other nationalities or languages, including those containing diacritical marks. You can also create new variants to process data of other nationalities. For more information, see Custom Data Types and Variants.

The following sections provide information about each type of person name standardization file:

- [Person Name Lexicon Files](#) on page 3-15
- [Person Name Normalization Files](#) on page 3-15
- [Person Name Process Definition Files](#) on page 3-16

Person Name Lexicon Files

Each PersonName variant contains a set of lexicon files. Each lexicon file contains a list of possible values for a field. The standardization engine matches input values against the values listed in these files to recognize input symbols and ensure correct tokenization. The OHMPI Standardization Engine uses these files when processing input symbols as defined in the process definition file (standardizer.xml). They are primarily used during the token matching portion of parsing. You can modify these files as needed by adding, deleting, or modifying values in the list. You can also create additional lexicon files.

The PersonName data type includes the following lexicon files:

- generation.txt
- givenNames.txt
- salutation.txt
- surnames.txt
- titles.txt

These files are located in the resource folder under each variant name.

Person Name Normalization Files

Each PersonName variant contains a set of normalization files that are used to normalize input values. The OHMPI Standardization Engine uses these files when processing input symbols as defined in the process definition file (standardizer.xml).

Each normalization file contains a column of unnormalized values, such as nicknames or abbreviations, and a second column that contains the corresponding normalized values. The values in each column are separated by a pipe symbol (|). You can modify these files as needed by adding, deleting, or modifying values in the list. You can also create additional normalization files to reference from the process definition file.

The PersonName data type includes the following normalization files:

- generationNormalization.txt
- givenNameNormalization.txt
- salutationNormalization.txt
- surnameNormalization.txt
- titleNormalization.txt

These files are located in the resource folder under each variant name.

Person Name Process Definition Files

Each variant has its own process definition file (standardizer.xml) that defines the state model for standardizing free-form person names. Each of these files also includes a section that defines just normalization without parsing for person names. The process definition file is located in the resource folder under each variant name. For information about the structure of this file, see [Process Definition File](#) on page 3-2.

Person name standardization has several states, each defining how to process tokens when they are found in certain orders. The default file defines states for salutations, first names, middle names, last names, titles, suffixes, and separators. It defines provisions for instances when the fields do not appear in order or when the input string does not contain complete data. For example, the current definition handles instances where the input string is "FirstName, MiddleName, LastName" as well as instances where the input string is "LastName, FirstName, MiddleName".

The process definition files for person names define several parsing rules for each field component. This file defines a set of cleansing rules to prepare the input string prior to any processing. Then the data is passed to the start state of the FSM. Most fields are preprocessed and then matched against regular expressions or against a list of values in a lexicon file (described in [Person Name Lexicon Files](#) on page 3-15). Postprocessing includes replacing regular expressions or normalizing the field value based on a normalization file (described in [Person Name Normalization Files](#) on page 3-15). The process definition files also define a set of normalization rules, which are followed when the incoming data already contains name information in separate fields and does not need to be parsed.

Person Name Standardization and Oracle Healthcare Master Person Index

Master person index applications rely on the OHMPI Standardization Engine to process person name data. To ensure correct processing of person information, you need to customize the Matching Service for the master person index application according to the rules defined for the standardization engine. This includes modifying mefa.xml to define normalization or standardization and phonetic encoding of the appropriate fields. You can modify mefa.xml with the Master Person Index Configuration Editor in the master person index project.

Standardization is defined in the StandardizationConfig section of mefa.xml, which is described in detail in *Oracle Healthcare Master Person Index Configuration Reference*. To configure the required fields for normalization, modify the normalization structure in mefa.xml. To configure the required fields for parsing and normalization, modify the

standardization structure. To configure phonetic encoding, modify the phonetic encoding structure. These tasks can all be performed using the Master Person Index Configuration Editor.

Generally, the person data type processes data that is parsed prior to processing, so you should not need to configure fields to parse unless your person data is stored in free-form text fields with all name information in one field. When processing person data, you might also want to search on address information. In that case, you need to configure the address fields to standardize and normalize.

The following sections provide information about the fields used in processing person data and how to configure person data standardization for a master person index application. The information provided in these topics is based on the default configuration.

- [Person Name Processing Fields](#) on page 3-17
- [Configuring a Normalization Structure for Person Names](#) on page 3-18
- [Configuring a Standardization Structure for Person Names](#) on page 3-19
- [Configuring Phonetic Encoding for Person Names](#) on page 3-20

Person Name Processing Fields

When standardizing person data, not all fields in a record need to be processed by the Master Person Index Standardization Engine. The standardization engine only needs to process fields that must be standardized, normalized, or phonetically converted. For a master person index application, these fields are defined in `mefa.xml` and processing logic for each field is defined in the standardization engine configuration files.

Person Name Standardized Fields

The OHMPI Standardization Engine can process person data that is provided in separate fields within a single record, meaning that no parsing is required of the name fields prior to normalization. It can also process person data contained in one long free-form field and parse the field into its individual components, such as first name, last name, title, and so on. Typically, only first and last names are normalized and phonetically encoded when standardizing person data, but the standardization engine can normalize and phonetically encode any field you choose. By default, the standardization engine processes these fields: first name, middle name, last name, nickname, salutation, generational suffix, and title.

Person Name Object Structure

The fields you specify for person name matching in the Master Person Index wizard are automatically defined for standardization and phonetic encoding. If you specify the `PersonFirstName` or `PersonLastName` match type in the wizard, the following fields are automatically added to the object structure and database creation script:

- `field_name_Std`
- `field_name_Phon`

where `field_name` is the name of the field for which you specified person name matching.

For example, if you specify the `PersonFirstName` match type for the `FirstName` field, two fields, `FirstName_Std` and `FirstName_Phon`, are automatically added to the structure. You can also add these fields manually if you do not specify match types in the wizard. If you are parsing free-form person data, be sure all output fields from the standardization process are included in the master person index object structure. If

you store additional names in the database, such as alias names, maiden names, parent names, and so on, you can modify the phonetic structure to phonetically encode those names as well.

Configuring a Normalization Structure for Person Names

The fields defined for normalization for the `PersonName` data type can include any name fields. By default, normalization rules are defined in the process definition file for first, middle, and last name fields, and you can easily define additional fields. You only need to define a normalization structure for person data if you are processing individual fields that do not require parsing. Follow the instructions under “Defining OHMPI Normalization Rules” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for normalization. For the standardization-type element, enter **PersonName**. For a list of field IDs to use in the standardized-object-field-id element, see [Person Name Standardization Components](#) on page 3-14.

A sample normalization structure for person data is shown below. This sample specifies that the `PersonName` standardization type is used to normalize the first name, alias first name, last name, and alias last name fields. For all name fields, both United States and United Kingdom domains are defined for standardization.

```
<structures-to-normalize>
  <group standardization-type="PersonName"
    domain-selector="com.sun.mdm.index.matching.impl.MultiDomainSelector">
    <locale-field-name>Person.PobCountry</locale-field-name>
    <locale-maps>
      <locale-codes>
        <value>UNST</value>
        <locale>US</locale>
      </locale-codes>
      <locale-codes>
        <value>GB</value>
        <locale>UK</locale>
      </locale-codes>
    </locale-maps>
    <unnormalized-source-fields>
      <source-mapping>
        <unnormalized-source-field-name>Person.FirstName
        </unnormalized-source-field-name>
        <standardized-object-field-id>FirstName
        </standardized-object-field-id>
      </source-mapping>
      <source-mapping>
        <unnormalized-source-field-name>Person.LastName
        </unnormalized-source-field-name>
        <standardized-object-field-id>LastName
        </standardized-object-field-id>
      </source-mapping>
    </unnormalized-source-fields>
    <normalization-targets>
      <target-mapping>
        <standardized-object-field-id>FirstName
        </standardized-object-field-id>
        <standardized-target-field-name>Person.FirstName_Std
        </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>LastName
        </standardized-object-field-id>
        <standardized-target-field-name>Person.LastName_Std
```

```

        </standardized-target-field-name>
    </target-mapping>
</normalization-targets>
</group>
<group standardization-type="PersonName" domain-selector=
"com.sun.mdm.index.matching.impl.MultiDomainSelector">
    <locale-field-name>Person.PobCountry</locale-field-name>
    <locale-maps>
        <locale-codes>
            <value>UNST</value>
            <locale>US</locale>
        </locale-codes>
        <locale-codes>
            <value>GB</value>
            <locale>UK</locale>
        </locale-codes>
    </locale-maps>
    <unnormalized-source-fields>
        <source-mapping>
            <unnormalized-source-field-name>Person.Alias[*].FirstName
            </unnormalized-source-field-name>
            <standardized-object-field-id>FirstName
            </standardized-object-field-id>
        </source-mapping>
        <source-mapping>
            <unnormalized-source-field-name>Person.Alias[*].LastName
            </unnormalized-source-field-name>
            <standardized-object-field-id>LastName
            </standardized-object-field-id>
        </source-mapping>
    </unnormalized-source-fields>
    <normalization-targets>
        <target-mapping>
            <standardized-object-field-id>FirstName
            </standardized-object-field-id>
            <standardized-target-field-name>
            Person.Alias[*].FirstName_Std
            </standardized-target-field-name>
        </target-mapping>
        <target-mapping>
            <standardized-object-field-id>LastName
            </standardized-object-field-id>
            <standardized-target-field-name>
            Person.Alias[*].LastName_Std
            </standardized-target-field-name>
        </target-mapping>
    </normalization-targets>
</group>
</structures-to-normalize>

```

Configuring a Standardization Structure for Person Names

For free-form name fields, the source fields that are defined for standardization should include the predefined standardization components. For example, fields containing person name information can include the first name, middle name, last name, suffix, title, and salutation. The target fields you define can include any of these parsed components. Follow the instructions under “Defining OHMPI Standardization Rules” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for standardization. For the standardization-type element, enter **PersonName**. For a list of

field IDs to use in the standardized-object-field-id element, see [Person Name Standardization Components](#) on page 3-14.

A sample standardization structure for person name data is shown below. Only the United States variant is defined in this structure.

```
free-form-texts-to-standardize>
  <group standardization-type="PERSONNAME"
    domain-selector="com.sun.mdm.index.matching.impl.SingleDomainSelectorUS">
    <unstandardized-source-fields>
      <unstandardized-source-field-name>Person.Name
    </unstandardized-source-field-name>
    </unstandardized-source-fields>
    <standardization-targets>
      <target-mapping>
        <standardized-object-field-id>salutation
      </standardized-object-field-id>
      <standardized-target-field-name>Person.Prefix
      </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>firstName
      </standardized-object-field-id>
      <standardized-target-field-name>Person.FirstName
      </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>middleName
      </standardized-object-field-id>
      <standardized-target-field-name>Person.MiddleName
      </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>lastName
      </standardized-object-field-id>
      <standardized-target-field-name>Person.LastName
      </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>suffix
      </standardized-object-field-id>
      <standardized-target-field-name>Person.Suffix
      </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>title
      </standardized-object-field-id>
      <standardized-target-field-name>Person.Title
      </standardized-target-field-name>
    </target-mapping>
    </standardization-targets>
  </group>
</free-form-texts-to-standardize>
```

Configuring Phonetic Encoding for Person Names

When you specify a first, middle, or last name field for person name matching in the Master Person Index wizard, that field is automatically defined for phonetic encoding. You can define additional names, such as maiden names or alias names, for phonetic encoding as well. Follow the instructions under “Defining Phonetic Encoding for the

Master Person Index” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for phonetic encoding.

A sample of fields defined for phonetic encoding is shown below. This sample converts name and alias name fields, as well as the street name.

```
<phoneticize-fields>
  <phoneticize-field>
    <unphoneticized-source-field-name>Person.FirstName_Std
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Person.FirstName_Phon
    </phoneticized-target-field-name>
    <encoding-type>Soundex</encoding-type>
  </phoneticize-field>
  <phoneticize-field>
    <unphoneticized-source-field-name>Person.LastName_Std
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Person.LastName_Phon
    </phoneticized-target-field-name>
    <encoding-type>NYSIIS</encoding-type>
  </phoneticize-field>
  <phoneticize-field>
    <unphoneticized-source-field-name>Person.Alias[*].FirstName_Std
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Person.Alias[*].FirstName_Phon
    </phoneticized-target-field-name>
    <encoding-type>Soundex</encoding-type>
  </phoneticize-field>
  <phoneticize-field>
    <unphoneticized-source-field-name>Person.Alias[*].LastName_Std
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Person.Alias[*].LastName_Phon
    </phoneticized-target-field-name>
    <encoding-type>NYSIIS</encoding-type>
  </phoneticize-field>
  <phoneticize-field>
    <unphoneticized-source-field-name>Person.Address[*].AddressLine1_StName
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Person.Address[*].AddressLine1_StPhon
    </phoneticized-target-field-name>
    <encoding-type>NYSIIS</encoding-type>
  </phoneticize-field></phoneticize-fields>
```

Setting FSM-Based Telephone Number Configuration

By default, telephone number data is standardized using the finite state machine (FSM) framework. Processing telephone data involves parsing free-form data fields and normalizing certain field components prior to matching. The following topics describe the default configuration files that define telephone number processing logic and provide information about modifying mefa.xml in a master person index application for processing telephone data.

- [Telephone Number Standardization Overview](#) on page 3-22
- [Telephone Number Standardization Components](#) on page 3-22
- [Telephone Number Standardization Files](#) on page 3-22
- [Telephone Number Standardization Files](#) on page 3-22

Telephone Number Standardization Overview

Processing data using the PhoneNumber data type includes standardizing and matching telephone numbers. The OHMPI Standardization Engine can create the parsed and normalized values for free-form telephone data. These values are required for accurate searching and matching. Several configuration files designed specifically to handle telephone data are included to provide processing logic for the standardization process.

In addition, when processing telephone information, you might want to standardize addresses to enable searching against address information. This requires working with the address configuration files described in [Chapter 4, "Patterns-based Address Data Configuration."](#)

Telephone Number Standardization Components

Standardization engines use tokens to determine how each field is standardized into its individual field components and to determine how to normalize a field value. Tokens also identify the field components to external applications, like a master person index application. The following table lists each token generated by the OHMPI Standardization Engine for telephone data along with the standardization component they represent. You can only specify the predefined field IDs that are listed in this table unless you customize the existing data type or create a new data type or variant.

Token	Description
areaCode	Represents a field containing an area code.
phoneNumber	Represents a field containing the telephone number, excluding area code, country code, and extension.
extension	Represents a field containing a telephone number extension.
countryCode	Represents a field containing the country code for a telephone number.

Telephone Number Standardization Files

Only one configuration file is used to define standardization logic for processing telephone numbers. The process definition file (standardizer.xml) defines the state model and logic for processing telephone numbers. There is only one variant for the PhoneNumber data type that is designed to handle telephone numbers from all countries. The files that make up the variant are stored in the master person index project under PhoneNumber/Generic. The process definition file is located in the resource subdirectory. You can customize this file to fit your processing and standardization requirements for telephone numbers. For more information about the structure of this file, see [Process Definition File](#) on page 3-2.

Telephone number standardization has several states, each defining how to process tokens when they are found in certain orders. The default file defines states for country codes, area codes, phone numbers, and extensions. It defines provisions for instances when the fields do not appear in order or when the input string does not contain complete data. For example, the current definition handles instances where the input string begins with a country code or an area code, where it contains an extension, where it does not contain an extension, and when it contains multiple telephone numbers.

The process definition file for telephone numbers define several parsing rules for each field component. This file defines a set of cleansing rules to prepare the input string prior to any processing. Then the data is passed to the start state of the FSM. Most fields are matched against regular expressions and then postprocessed by replacing regular expressions. The output symbols are further processed by concatenating the digit groups of the actual phone number, separated by a hyphen.

Telephone Number Standardization and Oracle Healthcare Master Person Index

Master person index applications rely on the OHMPI Standardization Engine to process telephone number data. To ensure correct processing of telephone information, you need to customize the Matching Service for the master person index application according to the rules defined for the standardization engine. This includes modifying `mefa.xml` to define standardization of the appropriate fields. You can modify `mefa.xml` using the Master Person Index Configuration Editor.

Standardization is defined in the `StandardizationConfig` section of `mefa.xml`, which is described in detail in *Oracle Healthcare Master Person Index Configuration Reference*. To configure the required fields for parsing, modify the standardization structure in `mefa.xml`.

The following topics provide information about the fields used in processing telephone data and how to configure telephone number standardization for a master person index application. The information provided in these topics is based on the default configuration.

- [Telephone Number Processing Fields](#) on page 3-23
- [Configuring a Standardization Structure for Telephone Numbers](#) on page 3-24

Telephone Number Processing Fields

When standardizing telephone data, not all fields in a record need to be processed by the OHMPI Standardization Engine. The standardization engine only needs to process fields that must be parsed, normalized, or phonetically converted. For a master person index application, these fields are defined in `mefa.xml` and processing logic for each field is defined in the Standardization Engine node configuration files.

Telephone Number Standardized Fields

The OHMPI Standardization Engine can process telephone data that is contained in one long free-form field and can parse that field into its individual components. By default, the standardization engine separates telephone numbers into these field components: country code, area code, phone number, and extension.

Telephone Number Object Structure

To standardize telephone numbers in a master person index application, you need to manually define the standardization structure and you need to add the fields that will store the standardized field components to the object structure. In the default implementation, you can store any combination of the following telephone number field components in the master person index database.

- Country Code
- Area Code
- Phone Number
- Extension

The standardization engine has the capability to produce all of the above field components, but you only need to store the ones you need in the master person index database.

Configuring a Standardization Structure for Telephone Numbers

For free-form name fields, the source fields you define for standardization should include the standardization components predefined for the PhoneNumber data type. For example, any fields containing telephone number information can include the country code, area code, phone number, and extension. The target fields you define can include any of these parsed fields. Follow the instructions under “Defining OHMPI Standardization Rules” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for standardization. For the standardization-type element, enter **PhoneNumber**. For a list of field IDs to use in the standardized-object-field-id element, see [Telephone Number Standardization Components](#) on page 3-22.

A sample standardization structure for telephone number data is shown below. No variant is defined in this structure because the standardization rules apply to global numbers.

```
<free-form-texts-to-standardize>
  <group standardization-type="PHONENUMBER"
    domain-selector="com.sun.mdm.index.matching.impl.MultiDomainSelector">
    <unstandardized-source-fields>
      <unstandardized-source-field-name>Person.Phone[*].PhoneNumber
    </unstandardized-source-field-name>
    </unstandardized-source-fields>
    <standardization-targets>
      <target-mapping>

<standardized-object-field-id>countryCode</standardized-object-field-id>
      <standardized-target-field-name>Person.Phone[*].CountryCode
    </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>areaCode</standardized-object-field-id>
        <standardized-target-field-name>Person.Phone[*].AreaCode
    </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>phoneNumber</standardized-object-field-id>
        <standardized-target-field-name>Person.Phone[*].Number
    </standardized-target-field-name>
    </target-mapping>
      <target-mapping>
        <standardized-object-field-id>extension</standardized-object-field-id>
        <standardized-target-field-name>Person.Phone[*].Extension
    </standardized-target-field-name>
    </target-mapping>
      </standardization-targets>
    </group>
  </free-form-texts-to-standardize>
```

Patterns-based Address Data Configuration

This chapter provides conceptual information and procedures for setting up patterns-based address configuration and patterns-based business name configuration.

This chapter includes the following sections:

- [Setting Patterns-based Address Data Configuration](#) on page 4-1
- [Setting Patterns-based Business Name Configuration](#) on page 4-17

Setting Patterns-based Address Data Configuration

By default, address standardization is performed using the patterns-based framework. Processing street addresses involves parsing, normalizing, data typing, and using advanced patterns rules to map the address fields with their corresponding types, prior to matching. The following sections describe the configuration files that define address processing logic and provide instructions for modifying mefa.xml for processing address fields.

- [Address Data Standardization Overview](#) on page 4-1
- [Address Data Standardization Components](#) on page 4-2
- [Address Data Standardization Files](#) on page 4-6
- [Address Standardization and Oracle Healthcare Master Person Index](#) on page 4-14

Address Data Standardization Overview

Processing data using the Address data type includes both standardizing and matching on free-form address fields. The OHMPI Standardization Engine can create the parsed, normalized, and typed values for address data.

These values are needed for accurate searching and matching on address data. You can implement street address standardization and matching on its own, or within an application designed to process person or business information. Standardizing address information allows you to include address fields as search criteria, even though matching might not be performed against these fields.

Several configuration files are designed specifically to handle address data and define processing logic for the standardization process. These include address clues files, a patterns file, and a constants file. The United States address standardization engine is based on the work performed at the US Census Bureau. The clues files, in particular, are based on census bureau statistics.

Address Data Standardization Components

Standardization engines use tokens to determine how each field is standardized into its individual field components and to determine how to normalize a field value. Tokens also identify the field components to external applications like a master person index application. The following table lists each token generated by the OHMPI Standardization Engine for address data along with the standardization component they represent. You can only specify the predefined field tokens that are listed in this table for addresses unless you create a new data type or variant.

Token	Description
BoxDescript	Represents the P.O. box type from a standardized address field. By default, this is stored in the field_name_StName field in a master person index database.
BoxIdentif	Represents the parsed P.O. box number from a standardized address field. By default, this is stored in the field_name_HouseNo field in a master person index database.
NeighborhoodName	Represents the parsed structure street's block or neighborhood description from a standardized address field. This address component is not included in the default master person index standardization structure, but you can add it if needed.
NeighborhoodType	Represents the parsed structure street's block or neighborhood identifier from a standardized address field. This address component is not included in the default master person index standardization structure, but you can add it if needed.
HouseNumber	Represents the parsed house number from a standardized address field. By default, this is stored in the field_name_HouseNo field in a master person index database.
HouseNumPrefix	Represents the parsed house number prefix from a standardized address field (such as the "A" in "A 1587 4th Street"). This address component is not included in the default master person index standardization structure, but you can add it if needed.
HouseNumSuffix	Represents the parsed house number suffix from a standardized address field (such as the "B" in "5900 B Arnett Avenue"). This address component is not included in the default master person index standardization structure, but you can add it if needed.
MatchPropertyName	Represents the parsed match property name from a standardized address field and is an alternative representation of the field used by the standardization engine for blocking and phonetic encoding. This address component is not included in the default master person index standardization structure, but you can add it if needed.
MatchStreetName	Represents the parsed and standardized street name from a standardized address field and is an alternative representation of the field used by the standardization engine. If you want to store the standardized street name in the database (recommended), map this field to the street name field in the database. By default, this is stored in the field_name_StName field in a master person index database.

Token	Description
OrigPropertyName	Represents the parsed original property name (such as the name of a complex or business park) from a standardized address field. This address component is not included in the default master person index standardization structure, but you can add it if needed.
PropDesPrefDirection	Represents the parsed property direction from a standardized address field. This field ID handles cases where the direction is a prefix to the property description. By default, this is stored in the field_name_StDir field in a master person index database.
PropDesPrefType	Represents the parsed property type from a standardized address field. This field ID handles cases where the street type is a prefix to the property description. By default, this is stored in the field_name_StType field in a master person index database.
PropertySufDirection	Represents the parsed property direction from a standardized address field. This field ID handles cases where the direction is a suffix to the property description. By default, this is stored in the field_name_StDir field in a master person index database.
PropertySufType	Represents the parsed property type from a standardized address field. This field ID handles cases where the street type is a suffix to the property description. By default, this is stored in the field_name_StType field in a master person index database.
RuralRouteDescript	Represents the parsed rural route description from a standardized address field. By default, this is stored in the field_name_StName field in a master person index database.
RuralRouteIdentif	Represents the parsed rural route identifier from a standardized address field. By default, this is stored in the field_name_HouseNo field in a master person index database.
SecondHouseNumber	Represents the parsed second house number prefix from a standardized address field. This address component is not included in the default master person index standardization structure, but you can add it if needed.
SecondHouseNumberPrefix	Represents the parsed second house number prefix from a standardized address field (such as "25" in "25 319 10th Ave."). This address component is not included in the default master person index standardization structure, but you can add it if needed.
SecondStreetNameSufDirection	Represents the parsed second street direction from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
SecondStreetNameSufType	Represents the parsed second street type from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
OrigSecondStreetName	Represents the parsed second street name from a standardized address field (for example, an address might include a cross-street or a thoroughfare and dependent thoroughfare). This address component is not included in the default master person index standardization structure, but you can add it if needed.

Token	Description
OrigStreetName	Represents the parsed street name from an address field. If you want to store the original street name in the database, map this field to the street name field in the database. This address component is not included in the default standardization structure, but you can add it if needed.
StreetNamePrefDirection	Represents the parsed street direction from a standardized address field. This field ID handles cases where the direction is a prefix to the street name. By default, this is stored in the field_name_StDir field in a master person index database.
StreetNamePrefType	Represents the parsed street type from a standardized address field. This field ID handles cases where the street type is a prefix to the street name. By default, this is stored in the field_name_StType field in a master person index database.
StreetNameSufDirection	Represents the parsed street direction from a standardized address field. This field ID handles cases where the direction is a suffix to the street name. By default, this is stored in the field_name_StDir field in a master person index database.
StreetNameSufType	Represents the parsed street type from a standardized address field. This field ID handles cases where the street type is a suffix to the street name. By default, this is stored in the field_name_StType field in a master person index database.
StreetNameExtensionIndex	Represents the parsed street name extension from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
WithinStructDescript	Represents the parsed internal descriptor (such as "Floor") from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
WithinStructIdentif	Represents the parsed internal identifier (such as a floor number) from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
CityName	Represents a city name, within a state or a county, from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed. In case of the Japanese locale, it represents the second level of administrative division below the country's prefecture level in Japan. You can add it to the default standardization structure if needed.
CityDescriptor	Represents a city's description type from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed. In case of the Japanese locale, it represents the second level of administrative division below the country's prefecture level in Japan. You can add it to the default standardization structure if needed.
PostalCode	Represents the location postal code type from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.

Token	Description
StateName	Represents a given country's state name from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
CountryName	Represents a given state's county name from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
CountryCode	Represents a 3-digit ISO country name from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
ExtraInfo	Represents any extra information that was not included in any of the other parsed components. This address component is not included in the default standardization structure, but you can add it if needed.
BuildingUnit	Represents the parsed unit structure within a property name (such as the name of a building) from a standardized address field. This address component is not included in the default master person index standardization structure, but you can add it if needed.
PrefectureName	Represents the second level of administrative division below the country's state level from a standardized address field. This address component is mainly used in PRC (Mainland China). It also represents the first level of administrative division in Japan. You can add it to the default standardization structure if needed.
PrefectureDesc	Represents a prefecture's description type from a standardized address field. This address component is not included in the default standardization structure, but you can add it if needed.
TownName	This field is used in the Japanese locale. It represents the third level of administrative division below the country's prefecture and city levels. You can add it to the default standardization structure if needed.
TownDesc	Represents a town's description type from a standardized address field. This address component is not included in the default standardization structure. You can add it to the default standardization structure if needed.
TownshipName	This field is used in two different locales with the same meaning. Represents the fourth level of administrative division below the country's state, prefecture and county levels from a standardized address field. This address component is mainly used in PRC (Mainland China). It also represents the fourth level of administrative division in Japan. You can add it to the default standardization structure if needed.
TownshipDesc	Represents a township's description type from a standardized address field. This address component is not included in the default standardization structure. You can add it to the default standardization structure if needed.
DistrictNumber	Represents the fifth level of administrative division in Japan. You can add it to the default standardization structure if needed.

Token	Description
DistrictDesc	Represents a district's description type from a standardized address field. This address component is not included in the default standardization structure. You can add it to the default standardization structure if needed.
BlockNumber	Represents the sixth level of administrative division in Japan. You can add it to the default standardization structure if needed.
BlockDesc	Represents a block's description type from a standardized address field. This address component is not included in the default standardization structure. You can add it to the default standardization structure if needed.

Note: PrefectureName, PrefectureDesc, TownName, TownDesc, TownshipName, TownshipDesc, DistrictNumber, DistrictDesc, BlockNumber, and BlockDesc are new token types. They are implemented in the Japan standardization locale for this release and some of them were already implemented in the China standardization locale for the previous release.

Address Data Standardization Files

Three configuration files define address processing logic for the OHMPI Standardization Engine. These files provide information about address patterns and tokens to help the standardization engine determine how to recognize address components and break them out into their respective tokens. You can customize any of the configuration files described in this section to fit your processing and standardization requirements for address data.

The address configuration files are located in the resource folder under each variant name for the Address data type. The following topics provide information about each configuration file.

- [Address Clues File](#) on page 4-6
- [Address Master Clues File](#) on page 4-7
- [Address Patterns File](#) on page 4-8
- [Address Pattern File Components](#) on page 4-11

Address Clues File

The address clues file (clues.dat) lists common terms in street addresses, specifies a normalized value for each common term, and categorizes the terms into street address component types. A term can be categorized into multiple component types. A relevance value specifies which of the component types the term is most likely to be. For example, the term "Junction" is standardized as "Jct" and is classified as a street type, building unit, and generic term (giving relevance in that order).

This file helps the OHMPI Standardization Engine recognize common terms in street addresses in order to parse and normalize the values correctly. The syntax of this file is:

```
common-term normalized-term ID-number/type-token
```


You can modify or add entries in this table as needed. The following table describes the columns in the address clues file.

Column	Description
common-term	A term commonly found in street addresses.
normalized-term	The normalized version of the common term.
ID-number/type-token	An ID number and a token indicating the type of address component represented by the common term. The ID number corresponds to an ID number in the address master clues file, and the type token corresponds to the type specified for that ID number in the address master clues file. One term might have several ID number and token type pairs. Their order of appearance indicates their relevance value.

Following is an excerpt from the US address clues file.

TRLR VLG	Trpk	59BU		
TRPK	Trpk	59BU		
TRPRK	Trpk	59BU		
VILLA	Vlla	305TY	60BU	
VLLA	Vlla	305TY	60BU	
VILLAS	Vlla	60BU		
VILL	Vlg	317TY	61BU	364AU
VILLAG	Vlg	317TY	61BU	364AU
VLG	Vlg	317TY	61BU	364AU
VILLAGE	Vlg	317TY	61BU	364AU
VILLG	Vlg	317TY	61BU	364AU
VILLIAGE	Vlg	317TY	61BU	364AU
VLGE	Vlg	317TY	61BU	364AU
VIVI	Vivi	62BU		
VIVIENDA	Vivi	62BU		
COLLEGE	Coll	64BU		0AU
CLG	Coll	64BU		
COTTAGE	Cott	65BU	65BP	0AU

Address Master Clues File

The address master clues file (masterClues.dat) lists common terms in street addresses as defined by the United States Postal Service (USPS), the United Kingdom's Royal Mail, the Australian Postal Corporation, France's La Poste (depending on the variant in use), or Mexico's Postal Service. For each common term, this file specifies a normalized value, defines postal information, and categorizes the terms into street address component types. A term can be categorized into multiple component types.

The syntax of this file is:

```
ID-number common-term normalized-term short-abbrev postal-abbrev CFCCS
type-token usage-flag postal-flag
```

You can modify or add entries in this table as needed. The following table describes the columns in the address master clues file.

Column	Description
ID-number	A unique identification number for the address common term. This number corresponds to an ID number for the same term in the address clues file.

Column	Description
common-term	A common address term, such as Park, Village, North, Route, Centre, and so on.
normalized-term	The normalized version of the common term.
short-abbrev	A short abbreviation of the common term.
postal-abbrev	The standard postal abbreviation of the common term. This is less used in other locales.
CFCCS	The census feature class code of the term (as defined in the Census Tiger® database). The following values are used: <ul style="list-style-type: none"> ■ A - Road ■ B - Railroad ■ C - Miscellaneous ■ D - Landmark ■ E - Physical feature ■ F - Nonvisible feature ■ H - Hydrography ■ X - Unclassified <p>These are not used in other locales.</p>
type-token	The type of address component represented by the common term. Types are specified by an address token (for more information, see Address Type Tokens).
usage-flag	A flag indicating how the term is used (for more information, see Pattern Classes on page 4-13).
postal-flag	The standard postal code for the term. This is less used in other countries or locales.

Following is an excerpt from the US address master clues file.

11Alley	Alley	Al	Aly A	TY R U
12Alternate Route	Alt Rte	Alt	Alt A	TY R
15Arcade	Arcade	Arc	Arc A	TY R U
16Arroyo	Arroyo	Arryo	ArryHA	TY R
17Autopista	Atpta	Apta	AptaA	TY R
18Avenida	Avenida	Ava	Ava A	TY R
19Avenue	Avenue	Ave	Ave A	TY R U
26Boulevard	Blvd	Blvd	BlvdA	TY R U
32Bulevar	Blvr	Blv	Blv A	TY R
33Business Route	Bus Rte	BusRt	BsRtA	TY R
34Bypass	Bypass	Byp	Byp A	TY R U
36Calle	Calle	Calle	ClleA	TY R
37Calleja	Calleja	Cja	Cja A	TY R
38Callejon	Callej	Cjon	CjonA	TY R
39Camino	Camino	Cam	Cam A	TY R
47Carretera	Carrt	Carr	CarrA	TY R
48Causeway	Cswy	Cswy	CswyAH	TY R U
51Center	Center	Ctr	Ctr DA	TY R U

Address Patterns File

The address patterns file (patterns.dat) defines the expected input patterns of each individual street address field being standardized so the Master Person Index

Standardization Engine can recognize and process these values. Tokens indicate the type of address component in the input and output fields. This file contains two rows for each pattern. The first row defines the input pattern for each address field and provides an example. The second row defines the output pattern for each address field, the pattern type, the relative importance of the pattern compared to other patterns, and usage flags. Below is an example.

```
AU A1 TY          01 Oak B Street
NA NA ST          T* 75                TX
```

When an address is parsed, each line of the address is delineated by a pipe (|) and sent to the parser separately. The output tokens for each line are then concatenated and the output pattern is processed using the address patterns file to determine whether the output pattern is listed in the file. If the pattern is found, output patterns are modified as indicated in the patterns file to resolve any ambiguities that might arise when two lines of address information contain common elements. The relative importance determines which pattern to use when the format of the input field matches more than one pattern. This file should only be modified by personnel with a thorough understanding of address patterns and tokens.

The syntax of this file is:

```
input-pattern example output-pattern pattern-class pattern-modifier priority
usage-flag exclude-flag
```

You can modify or add entries in this table as needed. The following table describes the columns in the address patterns file.

Column	Description
input-pattern	Tokens that represent a possible input pattern from an individual unparsed street address field. Each token represents one component. For more information about address tokens, see Address Type Tokens on page 4-11.
example	An example of a street address that fits the specified pattern. This file element is optional.
output-pattern	Tokens that represent the output pattern for the specified input pattern. Each token represents one component of the output of the Master Person Index Standardization Engine. For more information about address tokens, see Address Type Tokens on page 4-11.
pattern-class	An indicator of the type of address component represented by the pattern. Possible pattern types are listed in Pattern Classes on page 4-13.
pattern-modifier	An indicator of whether the priority of the pattern is averaged against other patterns that match the input. Pattern modifiers are listed in Pattern Modifiers on page 4-14.
priority	The priority weight to use for the pattern when the pattern is a sub-pattern of a larger input pattern. For more information, see Priority Indicators on page 4-14.
usage-flag	A flag indicating how the term is used (for more information, see Pattern Classes on page 4-13). This file element is optional.
exclude-flag	This file element is optional.

The following are excerpts from the address patterns files.

For United States Locale:

NU NU FC TY // 123 8 1/2 street
 HN NA NA ST H* 90

 NU AU FC TY // 123 8th 1/2 street
 HN NA NA ST H* 90

 NU DR SA TY // 123 South Michigan Street
 HN PD NA ST H* 95

 NU DR TY NU DR // 123 South Avenida 1 West
 HN PD PT NA SD H* 70

For Mexico Locale:

TY NU ND NU // Calle 6 No 1810
 PT NA P1 HN H* 75

 TY SA NU // Avenida Durango 15
 PT NA HN H* 85

 TY SC NU // Avenida Tijuana 35
 PT NA HN H* 85

 TY NU DM NU // AV. 5 DE FEBRERO 2125
 PT NA NA HN H* 85

 TY AU NU DR // Paseo Alcalde 1810 Norte
 PT NA HN SD H* 85

 CT ZP SC SA CC // TLALPAN 14330 TLALPAN DISTRITO FEDERAL,
 Mexico
 CT ZP CN SN CC S* 96

For Mainland China Locale:

PN BP // (ShenZhen Community)
 BI BY B* 65

 SC BP // (LinHe Community)
 BI BY B* 65

 TN BP // (Zhang feng Community)
 BI BY B* 65

 NU BU NU BU NU WD // 23201 (building #2, unit #3, room #201)
 BN TB NB BT WI WD W* 85

 NU BU DR BU NU WD // 2201 (building #2, east unit, room #201)
 BN TB NB BT WI WD W* 85

 NU BU NU BU DR WD // 23 (building #2, unit #3, west room)
 BN TB NB BT WI WD W* 85

 NU BU DR BU DR WD // 2 (building #2, east unit, west room)
 BN TB NB BT WI WD W* 85

For Japan Locale:

DR AU TY NU NU // 東塩小路通 721-1
 PD NA ST BI HN T* 70

```

DR A1 TY NU NU // 東塩通 721-1
PD NA ST BI HN T* 70

DR NU TY DR NU BP // 北 8 条 西 4 丁目
PD NA ST SD TN TD T* 80

DR NU TY DR // 北 8 条 西
PD NA ST SD T* 80

```

Address Pattern File Components

The address patterns files use pattern type tokens, pattern classes, pattern modifiers, and priority indicators to process and parse address data. Before modifying any of the patterns files, you must have a good understanding of these file components.

Address Type Tokens

The address pattern and clues files use tokens to denote different components in a street address, such as street type, house number, street names, and so on. These files use one set of tokens for input fields and another set for output fields. You can use only the predefined tokens to represent address components; the OHMPI Standardization Engine does not recognize custom tokens.

The following table lists and describes each input token.

Token	Description
A1	Alphabetic value, one character in length
AM	Ampersand
AU	Generic word
BP	Building property
BU	Building unit
BX	Post office box
CC	Country name abbreviation (3-letter ISO code)
CD	City descriptor
CT	City name
DA	Dash (as a starting character)
DR	Street direction
EI	Extra information
EX	Extension
FC	Numeric fraction
HR	Highway route
MP	Mile posts
ND	House number prefix or suffix
NL	Common words, such as "of", "the", and so on
NU	Numeric value
OT	Ordinal type

Token	Description
PD	Prefecture's descriptor
PN	Prefecture's name
PT	Prefix type
RR	Rural route
SA	State name
SC	County name
TD	Township's descriptor
TN	Township's name
TY	Street type
WD	Descriptor within the structure
WI	Identifier within the structure
ZD	Postal code description
ZP	Postal code

The following table lists and describes each output token.

Token	Description
1P	Building number prefix
2P	Second building number prefix
BD	Property or building directional suffix
BI	Structure (building) identifier
BN	Property or building name
BS	Building number suffix
BT	Property or building type suffix
BX	Post office box descriptor
BY	Structure (building) descriptor
CC	Country name abbreviation (3-letter ISO code)
CD	City descriptor
CN	County name
CT	City name
DB	Property or building directional prefix
EI	Extra information
EX	Extension index
H1	First house number (the actual number)
H2	Second house number (house number suffix)
HN	House number
HS	House number suffix
N2	Second street name

Token	Description
NA	Street name
NB	Building number
NL	Conjunctions that connect words or phrases in one component type (usually the street name)
P1	House number prefix
P2	Second house number prefix
PD	Directional prefix to the street name
PN	Prefecture's name
PR	Prefecture's descriptor
PT	Street type prefix to the street name
RR	Rural route descriptor
RN	Rural route identifier
S2	Street type suffix to the second street name
SD	Directional suffix to the street name
SN	State name
ST	Street type suffix to the street name
TB	Property or building type prefix
TD	Township's descriptor
TN	Township's name
WI	Identifier within the structure
WD	Descriptor within the structure
XN	Post office box identifier
ZP	Postal code

Pattern Classes

Each pattern defined in the address patterns file must have an associated pattern class. The pattern class indicates a portion of the input pattern or the type of address data that is represented by the pattern. You can specify any of the following pattern classes.

- **H** - the address pattern represents a house
- **B** - the address pattern represents a building
- **W** - the address pattern represents a unit within a structure, such as an apartment or suite number
- **T** - the address pattern represents a street type or direction
- **R** - the address pattern represents a rural route
- **P** - the address pattern represents a Post Office box
- **N** - the address pattern is mostly numeric
- **S** - the address pattern represents country, state, or county class

These classes are also specified as usage flags in the patterns file and the master clues file.

Pattern Modifiers

Each pattern type must be followed by a pattern modifier that indicates how to handle cases where one or more defined patterns is found to be a sub-pattern of a larger input pattern. In this case, the OHMPI Standardization Engine must know how to prioritize each defined pattern that is a part of the larger pattern. There are two pattern modifiers.

- * - An asterisk indicates that the priority weight for the matching pattern is averaged down equally with the other matching sub-patterns.
- + - A plus sign indicates that the priority weight for the matching pattern is not averaged down equally with the other matching sub-patterns.

Priority Indicators

The priority indicator is a numeric value following the pattern modifier that indicates the priority weight of the pattern. These values work best when defined as a multiple of five between and including 35 and 95. If a pattern is assigned a priority of 90 or 95 and the pattern matches, or is a sub-pattern of, the input pattern, the standardization engine stops searching for additional matching patterns and uses the high-priority matching pattern.

Address Standardization and Oracle Healthcare Master Person Index

Master person index applications rely on the OHMPI Standardization Engine to process address data. To ensure correct processing of address information, you need to customize the Matching Service for the master person index application according to the patterns defined for the standardization engine. This includes modifying `mefa.xml` to define parsing and phonetic encoding of the appropriate fields. You can use the Master Person Index Configuration Editor to modify `mefa.xml`.

Standardization is defined in the `StandardizationConfig` section of `mefa.xml`, which is described in detail in *Oracle Healthcare Master Person Index Configuration Reference*. To configure the required fields for standardization and normalization, modify the standardization structure in `mefa.xml`. To configure phonetic encoding, modify the phonetic encoding structure. You can perform all of these tasks using the Master Person Index Configuration Editor.

Generally, the address data type processes data that requires standardization prior to processing. You should not need to configure fields to normalize for addresses. The following topics provide information about the fields used in processing address data and how to configure address data standardization for a master person index application. The information provided in these sections is based on the default configuration.

- [Address Data Processing Fields](#) on page 4-14
- [Configuring a Standardization Structure for Address Data](#) on page 4-15
- [Configuring Phonetic Encoding for Address Data](#) on page 4-17

Address Data Processing Fields

When standardizing address data, not all fields in a record need to be processed by the OHMPI Standardization Engine. The standardization engine only needs to process address fields that might be used in the matching process. For a master person index application, these fields are defined in `mefa.xml` and processing logic for each field is defined in the Standardization Engine node configuration files.

Address Standardized Fields

The OHMPI Standardization Engine expects that street address data will be provided in a free-form text field containing several components that must be standardized (parsed, normalized and typed). By default, the standardized street name is configured to be phonetically encoded. You can specify additional fields for phonetic encoding.

If you specify the Address match type for any field in the wizard, a standardization structure for that field is defined in mefa.xml. The fields listed under [Address Data Processing Fields](#) on page 4-14 are automatically defined as the target fields. Each of these fields has several entries in the standardization structure. This is because different parsed components can be stored in the same field. For example, the house number, post office box number, and rural route identifier are all stored in the house number field. If you do not specify address fields for matching in the wizard but want to standardize the fields, you can create a standardization structure in mefa.xml using the Master Person Index Configuration Editor.

Address Object Structure

The address fields specified for standardization are parsed into several additional fields. If you specify the Address match type in the wizard, the following fields are automatically added to the object structure and database creation script.

- field_name_HouseNo
- field_name_StName
- field_name_StDir
- field_name_StType
- field_name_StPhon

where field_name is the name of the field for which you specified address matching. For example, if you specify the Address match type for the AddressLine1 field, the following fields are automatically added to the structure: AddressLine1_HouseNo, AddressLine1_StName, AddressLine1_StDir, AddressLine1_StType, and AddressLine1_StPhon.

You can add these fields manually if you do not specify a match type in the wizard.

Configuring a Standardization Structure for Address Data

For free-form address fields, the source fields you define for standardization should include the associated components that are predefined for parsing, normalization, and data typing. For example, fields containing address information can include any of the field components listed in Address Data Standardization Components. The target fields can include any of these parsed fields. Follow the instructions in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for standardization. For the standardization-type element, enter **Address**. For a list of field IDs to use in the standardized-object-field-id element, see Address Data Standardization Components.

Note: In the default configuration, the rules defined for the address data type assume that all input fields must be parsed as well as normalized. Thus, there is no need to configure fields only for normalization.

A sample standardization structure for address data is shown below. This structure parses the first two lines of street address into the standard street address fields. Only the United States variant is defined in this structure.

```

free-form-texts-to-standardize>
  <group standardization-type="ADDRESS"
    domain-selector="com.sun.mdm.index.matching.impl.SingleDomainSelectorUS">
    <unstandardized-source-fields>
      <unstandardized-source-field-name>Person.Address[*].Address1
    </unstandardized-source-field-name>
      <unstandardized-source-field-name>Person.Address[*].Address2
    </unstandardized-source-field-name>
    </unstandardized-source-fields>
    <standardization-targets>
      <target-mapping>
        <standardized-object-field-id>HouseNumber
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].HouseNumber
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>RuralRouteIdentif
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].HouseNumber
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>BoxIdentif
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].HouseNumber
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>MatchStreetName
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetName
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>RuralRouteDescript
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetName
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>BoxDescript
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetName
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>PropDesPrefDirection
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetDir
      </standardized-target-field-name>
      </target-mapping>
      <target-mapping>
        <standardized-object-field-id>PropDesSufDirection
      </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetDir
      </standardized-target-field-name>
    </standardization-targets>
  </group>

```

```

        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>StreetNameSufType
        </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetType
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>StreetNamePrefType
        </standardized-object-field-id>
        <standardized-target-field-name>Person.Address[*].StreetType
        </standardized-target-field-name>
    </target-mapping>
</standardization-targets>
</group>
</free-form-texts-to-standardize>

```

Configuring Phonetic Encoding for Address Data

When you match or standardize on street address fields, the street name should be specified for phonetic conversion (this is done by default in a master person index application). Follow the instructions in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for phonetic encoding.

A sample of the `phoneticize-fields` element is shown below. This sample only converts the address street name. You can define additional fields for phonetic encoding.

```

<phoneticize-fields>
    <phoneticize-field>
        <unphoneticized-source-field-name>Person.Address[*].StreetName
        </unphoneticized-source-field-name>
        <phoneticized-target-field-name>Person.Address[*].StreetName_Phon
        </phoneticized-target-field-name>
        <encoding-type>NYSIIS</encoding-type>
    </phoneticize-field>
</phoneticize-fields>

```

Setting Patterns-based Business Name Configuration

By default, business name standardization is performed using the patterns-based framework. Processing business name fields involves parsing, normalizing, and phonetically encoding certain fields prior to matching. The following sections describe the configuration files that define business name processing logic and provide instructions for modifying `mefa.xml` for processing business names.

- [Business Name Standardization Overview](#) on page 4-17
- [Business Name Standardization Components](#) on page 4-18
- [Business Name Standardization Files](#) on page 4-18
- [Business Name Standardization and Oracle Healthcare Master Person Index](#) on page 4-28

Business Name Standardization Overview

Processing data using the `BusinessName` data type includes both standardizing and matching on free-form business name fields. The OHMPI Standardization Engine can

create the parsed, normalized, and phonetic values for business names. These values are needed for accurate searching and matching on business information. You can implement business name standardization and matching on its own, or within an application designed to process person information. Standardizing business name fields allows you to include these fields as search criteria, even though matching might not be performed against these fields.

The OHMPI Standardization Engine can create standardized and phonetic values for business name field components. Several configuration files are designed specifically to handle business names to define additional logic for the standardization and phonetic encoding process. These include reference files, a patterns file, and key type files. The business name standardization files are contained in one generic variant.

Business Name Standardization Components

Standardization engines use tokens to determine how each field is standardized into its individual field components and to determine how to normalize a field value. Tokens also identify the field components to external applications like a master person index application. The following table lists each token generated by the OHMPI Standardization Engine for business names along with the standardization component they represent. You can only specify the predefined field tokens that are listed in this table for business names unless you create a new data type or variant.

Token	Description
PrimaryName	Represents the name parsed from a free-form text business name field.
OrgTypeKeyword	Represents the organization type parsed from a free-form text business name field.
AssocTypeKeyword	Represents the association type parsed from a free-form text business name field.
IndustrySectorList	Represents the industry sector parsed a free-form text business name field.
IndustryTypeKeyword	Represents the industry type parsed from a free-form text business name field (industry type is a subset of the sector).
AliasList	Represents the alias parsed from a free-form text business name field.
Url	Represents the URL parsed from a free-form text business name field.

Business Name Standardization Files

Several configuration files are used to define business name processing logic for the OHMPI Standardization Engine. These files provide information about business name patterns and tokens to help the standardization engine determine how to recognize business name components and break them out into their respective tokens. You can customize any of the configuration files described in this section to fit your processing and standardization requirements for business names.

The following topics described each file used for business name standardization:

- [Business Name Adjectives Key Type File](#) on page 4-19
- [Business Alias Key Type File](#) on page 4-19
- [Business Association Key Type File](#) on page 4-20
- [Business General Terms Reference File](#) on page 4-20

- [Business City or State Key Type File](#) on page 4-21
- [Business Former Name Reference File](#) on page 4-21
- [Merged Business Name Category File](#) on page 4-22
- [Primary Business Name Reference File](#) on page 4-22
- [Business Connector Tokens Reference File](#) on page 4-23
- [Business Country Key Type File](#) on page 4-23
- [Business Industry Sector Reference File](#) on page 4-24
- [Business Industry Key Type File](#) on page 4-24
- [Business Organization Key Type File](#) on page 4-25
- [Business Patterns File](#) on page 4-26

Business Name Adjectives Key Type File

The adjectives key type file (bizAdjectivesTypeKeys.dat) defines adjectives commonly found in business names so the OHMPI Standardization Engine can recognize and process these values as a part of the business name. This file contains one column with a list of commonly used adjectives, such as General, Financial, Central, and so on.

You can modify or add entries in this file as needed. Following is an excerpt from the adjectives key type file.

```
DIGITAL
DIRECTED
DIVERSIFIED
EDUCATIONAL
ELECTROCHEMICAL
ENGINEERED
EVOLUTIONARY
EXTENDED
FACTUAL
FEDERAL
```

Business Alias Key Type File

The alias key type file (bizAliasTypeKeys.dat) lists business name acronyms and abbreviations along with their standardized names so the standardization engine can recognize and process these values correctly. You can add entries to the alias key type file using the following syntax.

```
alias standardized-name
```

The following table describes the columns in the alias key type file.

Column	Description
alias	An abbreviation or acronym commonly used in place of a specific business name.
standardized-name	The normalized version of the alias name.

Following is an excerpt from the alias key type file.

```
BBH          BARTLE BOGLE HEGARTY
BBH          BROWN BROTHERS HARRIMAN
IBM          INTERNATIONAL BUSINESS MACHINE
```

```

IDS                INCOMES DATA SERVICES
IDS                INSURANCE DATA SERVICES
IDS                THE INTEGRATED DECISION SUPPORT GROUP
IDS                THE INTERNET DATABASE SERVICE
CAL-TECH          CALIFORNIA INSTITUTE OF TECHNOLOGY
    
```

Business Association Key Type File

The association key type file (bizAssociationTypeKeys.dat) lists business association types along with their standardized names so the standardization engine can recognize and process these values correctly. You can add entries to the association key type file using the following syntax.

association-type standardized-type

The following table describes the columns in the association key type file.

Column	Description
association-type	A common association type for businesses, such as Partners, Group, and so on.
standardized-type	The standardized version of the association type. If this column contains a name instead of a zero, that name must also be listed in a different entry as an association type with a standardized form of "0".

Following is an excerpt from the bizAssociationTypeKeys.dat file.

```

ASSOCIATES        0
BANCORP           0
BANCORPORATION    BANCORP
COMPANIES         0
GP                GROUP
GROUP             0
PARTNERS          0
    
```

Business General Terms Reference File

The general terms reference file (bizBusinessGeneralTerms.dat) lists terms commonly used in business names. This file is used to identify terms that indicate a business, such as bank, supply, factory, and so on, so the OHMPI Standardization Engine can recognize and process the business name.

This file contains one column that lists common terms in the business names you process. You can add entries as needed. Below is an excerpt from the general terms reference file.

```

BUILDING
CITY
CONSUMER
EAST
EYE
FACTORY
LATIN
NORTH
SOUTH
    
```

Business City or State Key Type File

The city or state key type file (bizCityorStateTypeKeys.dat) lists various cities and states that might be used in business names. It also classifies each entry as a city (CT) or state (ST) and indicates the country in which the city or state is located. This enables the standardization engine to recognize and process these values correctly. You can add entries to the city or state key type file using the following syntax.

```
city-or-state type country
```

The following table describes the columns in the file.

Column	Description
city-or-state	The name of a city or state used in business names.
type	An indicator of whether the value is a city or state. "CT" indicates city and "ST" indicates state.
country	The country code of the country in which the city or state is located.

Following is an excerpt from the city or state key type file.

```
ADELAIDE          CT  AU
ALABAMA           ST  US
ALASKA            ST  US
ALGIERS           CT  DZ
AMSTERDAM         CT  NL
ARIZONA           ST  US
ARKANSAS          ST  US
ASUNCION          CT  PY
ATHENS            CT  GR
```

Business Former Name Reference File

The business former name reference file (bizCompanyFormerNames.dat) provides a list of common company names along with names by which the companies were formerly known so the standardization engine can recognize a business when processing a record containing a previous business name. You can add entries to the business former name table using the following syntax.

```
former-name current-name
```

The following table describes each column in the business former name reference file.

Column	Description
former-name	One of the company's previous names.
current-name	The company's current name.

Below is an excerpt from the business former name reference file.

```
HELLENIC BOTTLING          COCA-COLA HBC
INTERNATIONAL PRODUCTS    THE TERLATO WINE
ORGANIC FOOD PRODUCTS     SPECTRUM ORGANIC PRODUCTS
SUTTER HOME WINERY        TRINCHERO FAMILY ESTATES
```

Merged Business Name Category File

The merged business name category file (bizCompanyMergerNames.dat) provides a list of companies whose name changed because of a merger along with the name of the company after the merge. It also classifies the business names into industry sectors and sub-sectors. This enables the standardization engine to recognize the current company name and determine the sector of the business. You can add entries to the business merger name file using the following syntax.

former-name/merged-name sector-code

The following table describes each column in the merged business name category file.

Column	Description
former-name	The name of the company whose name was not kept after the merger.
merged-name	The name of the company whose name was kept after the merger.
sector-code	The industry sector code of the business. Sector codes are listed in the bizIndustryCategoriesCode.dat file.

Below is an excerpt from the merged business name category file.

DUKE/FLUOR DANIEL	20005
FAULTLESS STARCH/BON AMI	09004
FIND/SVP	10013
FIRST WAVE/NEWPARK SHIPBUILDING	27005
GUNDLE/SLT	19020
HMG/COURTLAND	23004
J BROWN/LMC	10014
KORN/FERRY	10020
LINSCO/PRIVATE LEDGER	14005

Primary Business Name Reference File

The primary business name reference file (bizCompanyPrimaryNames.dat) provides a list of companies by their primary name. It also classifies the business names into industry sectors and sub-sectors. This enables the standardization engine to determine the correct value of the sector field when parsing the business name. You can add entries to the primary business name file using the following syntax.

primary-name sector-code

The following table describes the columns in the primary business name reference file.

Column	Description
primary-name	The primary name of the company.
sector-code	The industry sector code of the business. Sector codes are listed in the bizIndustryCategoriesCode.dat file.

Below is an excerpt from the primary business name reference file.

BROTHER INTERNATIONAL	12006
BRYSTOL-MYERS SQUIBB	11005
BURLINGTON COAT FACTORY	24003
BURLINGTON NORTHERN SANTA FE	27005
BV SOLUTIONS	06012

CABLEVISION	26001
CABOT	04006
CADENCE	06010
CAMPBELL	22006
CAPITAL BLUE CROSS	17001

Business Connector Tokens Reference File

The connector tokens reference file (bizConnectorTokens.dat) defines common values (typically conjunctions) that connect words in business names. For example, in the business name “Nursery of Venice”, “of” is a connector token. This helps the standardization engine recognize and process the full name of a business by indicating that the token connects two parts of the full name.

This file contains one column that lists the connector tokens in the business names you process. You can add entries as needed. Below is an excerpt from the connector tokens reference file.

```
AN
DE
DES
DOS
LA
LAS
LE
OF
THE
```

Business Country Key Type File

The country key type file (bizCountryTypeKeys.dat) lists countries and continents, along with their abbreviations and assigned nationalities. For continents, the abbreviation is “CON” to separate them from countries. This enables the standardization engine to recognize and process these values as countries or continents. You can add entries to the country key type file using the following syntax.

country abbreviation nationality

The following table describes the columns in the country key type file.

Column	Description
country	The name of a country or continent.
abbreviation	The common abbreviation for the specified country. The abbreviation for a continent is always “CON”.
nationality	The nationality assigned to a person or business originating in the specified country.

Following is an excerpt from the country key type file.

```
AMERICA          CON  AMERICAN
AFRICA           CON  AFRICAN
EUROPE          CON  EUROPEAN
ASIA            CON  ASIAN
AFGHANISTAN     AF   AFGHAN
ALBANIA         AL   ALBANIAN
ALGERIA         DZ   ALGERIAN
```

Business Industry Sector Reference File

The industry sector reference file (bizIndustryCategoryCode.dat) lists and groups various industry sectors and sub-sectors, and includes an identification code for each type so the standardization engine can identify and process the industry sectors for different businesses. You can add entries to the industry sector reference file using the following syntax.

```
sector-code industry-sector
```

The following table describes each column in the industry sector reference file.

Column	Description
sector-code	The identification code of the specified sector. The first two numbers of each code identify the general industry sector; the last three numbers identify a sub-sector.
industry-sector	A description of the industry category. This is written in the format "sector - sub-sector", where sector is a general category of industry types, and sub-sector is a specific industry within that category.

Following is an excerpt from the industry sector reference file.

```
02006      Automotive & Transport Equipment - Recreational Vehicles
02007      Automotive & Transport Equipment - Shipbuilding & Related Services
02008      Automotive & Transport Equipment - Trucks, Buses & Other Vehicles
03001      Banking - Banking
04001      Chemicals - Agricultural Chemicals
04002      Chemicals - Basic & Intermediate Chemicals & Petrochemicals
04003      Chemicals - Diversified Chemicals
04004      Chemicals - Paints, Coatings & Other Finishing Products
04005      Chemicals - Plastics & Fibers
04006      Chemicals - Specialty Chemicals
05001      Computer Hardware - Computer Peripherals
05002      Computer Hardware - Data Storage Devices
05003      Computer Hardware - Diversified Computer Products
```

Business Industry Key Type File

The industry key type file (bizIndustryTypeKeys.dat) is used to standardize the value of the Industry field into common industries to which businesses belong so the standardization engine can recognize and process the industry types for different businesses. You can add entries to the industry key type file using the following syntax.

```
industry-type standardized-form sectors
```

The following table describes each column in the industry key type file.

Column	Description
industry-type	The original value of the industry type in the input record.
standardized-form	The normalized version of the industry type. If this column contains a name instead of a zero, that name must also be listed in a different entry as an industry type with a standardized form of "0".

Column	Description
sectors	The industry categories of the specified industry type. These values correspond to the sector codes listed in the industry sector file (bizIndustryCategoryCode.dat). You can list as many categories as apply for each type, but they must be entered with a space between each and no line breaks, and they must correspond to an entry in the industry sector file.

Below is an excerpt from the industry key type file.

TECH	TECHNOLOGY	05001-05007			
TECHNOLOGIES	TECHNOLOGY	05001-05007			
TECHNOLOGY	0	05001-05007			
TECHSYSTEMS	0	05001-05007			
TELE PHONE	TELEPHONE	16005			
TELE PHONES	TELEPHONES	16005			
TELEVISION	TV	11013	21014		
TELECOM	0	16005	26006	26009	26010
TELECOMM	TELECOMMUNICATION	16005	26006	26008	
TELECOMMUNICATION	0	16005	26006	26008	

Business Organization Key Type File

The organization key type file (bizOrganizationTypeKeys.dat) is used to standardize the value of the Organization field into common organizations to which businesses belong. This helps the standardization engine recognize and process the organization types for different businesses. You can add entries to the organization key type file using the following syntax.

original-type standardized-form

The following table describes each column in the organization key type file.

Column	Description
original-type	The original value of the organization field in an input record.
standardized-form	The normalized version of an organization type. A zero (0) in this field indicates that the value in the first column is already in its standardized form. If this column contains a name instead of a zero, that name must also be listed in a different entry as an original type with a standardized form of "0".

Below is an excerpt from the organization key type file.

INC	INCORPORATED
INCORPORATED	0
KG	0
KK	0
LIMITED	0
LIMITED PARTNERSHIP	0
LLC	0
LLP	0
LP	LIMITED PARTNERSHIP
LTD	LIMITED

Business Patterns File

The business patterns file (bizpatterns.dat) defines multiple formats expected from the business name input fields along with the standardized output of each format. The patterns and output appear in two-row pairs in this file, as shown below.

```
4 PNT AST SEP-GLC ORT
PNT AST DEL ORT
```

The first line describes the input pattern and the second describes the output pattern using tokens to denote each component. The supported tokens are described in Business Name Tokens. A number at the beginning of the first line indicates the number of components in the given business name format. You can modify this file using the following syntax.

```
length input-pattern
output-pattern
```

The following table lists and describes the components in the above syntax.

Component	Description
length	The number of business name components in the input field.
input-pattern	Tokens that represent a possible input pattern from the unparsed business name fields. Each token represents one component. For more information about address tokens, see Business Name Tokens.
output-pattern	Tokens that represent the output pattern for the specified input pattern. Each token represents one component. For more information about business name tokens, see Business Name Tokens.

Below is an excerpt from the business patterns file.

```
4 PNT AST SEP-GLC ORT
PNT AST DEL ORT
```

```
4 NFG AJT SEP-GLC ORT
PNT PNT DEL ORT
```

```
4 NF AJT SEP-GLC ORT
PNT PNT DEL ORT
```

```
4 CST IDT NF ORT
PNT PNT PNT ORT
```

```
4 PNT AJT SEP-GLC ORT
PNT PNT DEL ORT
```

Business Name Tokens

The business patterns file uses tokens to denote different components in a business name, such as the primary name, alias type key, URL, and so on. The file uses one set of tokens for input fields and another set for output fields. The tokens indicate the type key files to use to determine the appropriate values for each output field. You can use only the predefined tokens to represent business name components; the standardization engine does not recognize custom tokens.

The following table lists and describes each input token.

Pattern Identifier	Description
CTT	A connector token
PNT	A primary name of a business
PN-PN	A hyphenated primary name of a business
BCT	A common business term
URL	The URL of a business web site
ALT	A business alias type key (usually an acronym)
CNT	A country name
NAT	A nationality
CST	A city or state type key
IDT	An industry type key
IDT-AJT	Both an industry and an adjective type key
AJT	An adjective type key
AST	An association type key
ORT	An organization type key
SEP	A separator key
NFG	Generic term, not recognized as a specific business name component, with an internal hyphen
NF	Generic term, not recognized as a specific business name component
NFC	A single character, not recognized as a specific business name component
SEP-GLC	A joining comma (a glue type separator)
SEP-GLD	A joining hyphen (a glue type separator)
AND	The text "and"
GLU	A glue type key, such as a forward slash, connecting two parts of a business name component
PN-NF	A business primary name followed by a hyphen and a generic term that is not recognized as a specific business name component
NF-PN	A generic term that is not recognized as a specific business name component, followed by a hyphen and a recognized business primary name
NF-NF	Two generic terms, not recognized as specific business name components and separated by a hyphen

The following table lists and describes each output token.

Pattern Identifier	Description
PNT	The primary name of the business
URL	The URL of the business
ALT	The alias type key of the business (usually an acronym)
IDT	The industry type key of the business

Pattern Identifier	Description
AST	The association type key of the business
ORT	The organization type key of the business
NF	A generic term not recognized as a business name component

Business Name Standardization and Oracle Healthcare Master Person Index

Master person index applications rely on the OHMPI Standardization Engine to process business data. To ensure correct processing of business information, you need to customize the Matching Service for the master person index application according to the rules defines for the standardization engine. This includes modifying mefa.xml to define parsing and phonetic encoding of the appropriate fields. You can modify mefa.xml using the Master Person Index Configuration Editor.

Standardization is defined in the StandardizationConfig section of mefa.xml, which is described in detail in *Oracle Healthcare Master Person Index Configuration Reference*. To configure the required fields for parsing and normalization, modify the standardization structure in mefa.xml. To configure phonetic encoding, modify the phonetic encoding structure.

Generally, the BusinessName data type processes data that requires parsing prior to processing. You should not need to configure fields to normalize for business names. The following topics provide information about the fields used in processing business names and how to configure standardization for a master person index application. The information provided in these sections is based on the default configuration.

- [Business Name Processing Fields](#) on page 4-28
- [Business Name Standardized Fields](#) on page 4-28
- [Configuring a Standardization Structure for Business Names](#) on page 4-29
- [Configuring Phonetic Encoding for Business Names](#) on page 4-30

Business Name Processing Fields

When standardizing free-form business names, not all fields in a record need to be processed by the OHMPI Standardization Engine. The standardization engine only needs to process fields that must be parsed, normalized, or phonetically converted. For a master person index application, these fields are defined in mefa.xml, and processing logic for each field is defined in the Standardization Engine node configuration files.

Business Name Standardized Fields

The OHMPI Standardization Engine expects that business name data will be provided in a free-form text field containing several components that must be parsed. By default, the match engine is configured to parse these components, and to normalize and phonetically encode the business name. You can specify additional fields for phonetic encoding.

If you specify the BusinessName match type for any field in the wizard, a standardization structure for that field is defined in mefa.xml. The fields listed under [Business Name Object Structure](#) on page 4-28 are automatically defined as the target fields. If you do not specify business name fields for matching in the wizard but want to standardize the fields, you can create a standardization structure in mefa.xml

Business Name Object Structure

For the default configuration of the BusinessName data type, the name field specified for standardization is parsed into several additional fields, one of which is also normalized. If you specify the BusinessName match type in the wizard, the following fields are automatically added to the object structure and database creation script.

- field_name_Name
- field_name_NamePhon
- field_name_OrgType
- field_name_AssocType
- field_name_Industry
- field_name_Sector
- field_name_Alias
- field_name_Url

where field_name is the name of the field for which you specified business name matching. For example, if you specify the BusinessName match type for the Company field, the fields automatically added to the structure include Company_Name, Company_NamePhon, Company_OrgType, and so on.

You can add these fields manually if you do not specify a match type in the wizard.

Configuring a Standardization Structure for Business Names

For free-form business name fields, the source fields you define for parsing should include the standardization components that are predefined for parsing and normalization. For example, fields containing business information can include any of the field components listed in [Business Name Standardization Components](#) on page 4-18. The target fields can include any of these parsed fields. Follow the instructions under “Defining OHMPI Standardization Rules” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for standardization. For the standardization-type element, enter **BusinessName**. For a list of field IDs to use in the standardized-object-field-id element, see [Business Name Standardization Components](#) on page 4-18.

Note: In the default configuration, the rules defined for the address data type assume that all input fields must be parsed as well as normalized. Thus, there is no need to configure fields only for normalization.

A sample standardization structure for business names is shown below. This structure parses a business name field into these standard business name fields: name, organization type, association type, sector, industry, and URL. Note that there is no domain selector specified, which would normally default to the United States domain; however, since business names are not variant dependent, it is irrelevant here.

```
<free-form-texts-to-standardize>
  <group standardization-type="BusinessName">
    <unstandardized-source-fields>
      <unstandardized-source-field-name>Company.Name
    </unstandardized-source-field-name>
    </unstandardized-source-fields>
    <standardization-targets>
      <target-mapping>
        <standardized-object-field-id>PrimaryName
```

```

        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_Name
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>OrgTypekeyword
        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_OrgType
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>AssocTypeKeyword
        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_AssocType
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>IndustrySectorList
        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_Sector
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>IndustryTypeKeyword
        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_Industry
        </standardized-target-field-name>
    </target-mapping>
    <target-mapping>
        <standardized-object-field-id>Url
        </standardized-object-field-id>
        <standardized-target-field-name>Company.Name_URL
        </standardized-target-field-name>
    </target-mapping>
</standardization-targets>
</group>
</free-form-texts-to-standardize>

```

Configuring Phonetic Encoding for Business Names

When you match or standardize on business name fields, the business name field should be specified for phonetic conversion (by default, the wizard defines this for you). Follow the instructions under “Defining Phonetic Encoding for the Master Person Index” in *Oracle Healthcare Master Person Index Configuration Guide* to define fields for phonetic encoding.

A sample of the `phoneticize-fields` element is shown below. This sample only converts the business name. You can define additional fields for phonetic encoding.

```

<phoneticize-fields>
  <phoneticize-field>
    <unphoneticized-source-field-name>Company.Name_Name
    </unphoneticized-source-field-name>
    <phoneticized-target-field-name>Company.Name_NamePhon
    </phoneticized-target-field-name>
    <encoding-type>NYSIIS</encoding-type>
  </phoneticize-field>
</phoneticize-fields>

```

Custom FSM-Based Data Types and Variants

This chapter provides conceptual information and procedures for creating custom FSM-based data types and variants.

This chapter includes the following sections:

- [Learning About Custom FSM-Based Data Types and Variants](#) on page 5-1
- [Learning About the Standardization Packages](#) on page 5-2
- [Creating Custom FSM-Based Data Types](#) on page 5-2
- [Creating Custom FSM-Based Variants](#) on page 5-5

Learning About Custom FSM-Based Data Types and Variants

The finite state machine framework of the OHMPI Standardization Engine is very flexible, allowing you to define new data types and variants so you can standardize any type of data. This process requires no Java coding; all processing rules and logic are defined in XML files using predefined rules. The new data types and variants can be imported into NetBeans for use in master person index projects. The following sections provide information and instructions for creating custom data types and variants.

Creating a custom FSM data type or variant for the OHMPI Standardization Engine requires defining the processing logic for the data type in an XML file. No Java coding is required in order to incorporate the comparators into a master person index application. The processing logic is based in the files described in Finite State Machine Framework Configuration.

You define the following information for each data type or variant you create.

- The state model that defines each state, its input and output symbols, and transitions
- Any preprocessing, matching, or postprocessing logic for input and output symbols
- Any cleansing rules to be applied to the data prior to parsing
- Optionally, lists of non-standard values and the standard values to which they should be converted (such as a nickname table)
- Optionally, lists of possible values for a field component that helps the standardization engine identify and parse the component

After you create the package, you can import the custom data type or variant into NetBeans using the easy import function of Oracle Healthcare Master Person Index.

You can then define standardization and normalization structures for the master person index using the new data type or variant.

Learning About the Standardization Packages

After you create a custom data type or variant you need to package the files in a ZIP file so they are available for import into NetBeans. Create a single package for each data type or variant.

For a custom data type, the ZIP file includes the following:

- A service type definition file
- One or more service instance definition files (depending on how many variants you include)
- One or more process definition files (standardizer.xml)
- Normalization files (optional)
- Lexicon files (optional)

For a custom variant, the ZIP file includes the following:

- One service instance definition file
- One process definition file (standardizer.xml)
- Normalization files (optional)
- Lexicon files (optional)

Creating Custom FSM-Based Data Types

You can define new data types and their corresponding variants using the flexible FSM framework of the standardization engine. Data types are easily incorporated into a master person index project and can be made globally available to all projects. Perform the following steps to define a custom data type for the standardization engine.

- [Creating the Working Directory](#) on page 5-2
- [Defining the Service Type](#) on page 5-3
- [Defining the Variants](#) on page 5-4
- [Packaging and Importing the Data Type](#) on page 5-4
- [Service Type Definition File](#) on page 5-4

Creating the Working Directory

The working directory for custom data types requires a specific structure. At a minimum, the working directory will look similar to the following:

```
/WorkingDir
  serviceType.xml
  /lib
  /instance
    /Generic
      serviceInstance.xml
    /resource
      standardizer.xml
```

If the data type has several variants, the directory structure will not include the Generic folder, but will contain several folders named by the variants name in its place. Each variant folder must be of the same structure as the Generic folder shown above. The resource directory might also contain several normalization and lexicon files.

To Create the Working Directory

1. Create a working directory and add a lib and an instance directory at the top level.
2. Copy the files `standardizer-api.jar` and `standardizer-impl.jar` from `/NetBeans_Home/soa2/modules/ext/mdm/standardizer/lib` to the lib directory.
3. Do one of the following:
 - If the data type only has one variant, create the following directory structure in the instance directory:


```
/Generic/resource/
```
 - If the data type has several variants, create the following directory structure in the instance directory for each variant:


```
/VariantName/resource/
```
4. Continue to [Defining the Service Type](#).

Defining the Service Type

The `serviceType.xml` file defines information about the data type, and is a required file for each data type.

To Define the Service Type

1. Create a file named `serviceType.xml` in your working directory.

Note: You can copy the service type file from an existing data type and modify it for your use.

2. Enter text similar to the following, where `description` is the name of the data type and the value elements list the tokens, or standardization components, of the data type.

```
<serviceType configurationResource="standardizer.xml">
  <description>My Data Type Standardization</description>
  <parameter name="fields">
    <list>
      <value>Data Field1</value>
      <value>Data Field2</value>
      ...
    </list>
  </parameter>
</serviceType>
```

Note: For more information about the elements in this file, see [Service Type Definition File](#) on page 5-4.

3. Save and close the file.

4. Continue to [Defining the Variants](#).

Defining the Variants

For each data type you create, you need to create one or more variants that define the logic for processing a specific type of data.

To Define the Variants

Perform the following steps for each variant that will be used for the data type you are creating.

1. Define the service instance, as described in [Defining the Service Instance](#) on page 5-5.
Create the serviceInstance.xml file in /WorkingDir/instance/VariantName.
2. Define the state model and processing logic, as described in [Defining the State Model and Processing Rules](#) on page 5-6.
Create the standardizer.xml file in /WorkingDir/instance/VariantName/resource.
3. If needed, create normalization and lexicon files, as described in [Creating Normalization and Lexicon Files](#) on page 5-7.
Create the files in /WorkingDir/instance/VariantName/resource.
4. Continue to [Packaging and Importing the Variant](#).

Packaging and Importing the Data Type

Once you have created all the files for the data type, you need to package them into a ZIP file to be imported into a master person index application.

To Package and Import the Data Type

1. In the working directory, select the folders and files at the top level and add them to a ZIP file.
2. Name the ZIP file the same name as the data type.
The ZIP file structure should look similar to the following:
3. Import the file into a master person index application as described in *Oracle Healthcare Master Person Index Configuration Guide*.

Service Type Definition File

Each data type is configured by a service type definition file, serviceType.xml. Service type files define the fields to be standardized for a data type. The following table lists and describes the elements in the service type file.

Element	Description	Attribute
serviceType	A description and any parameters for the data type.	
configurationResource	The name of the standardization process file that defines the states and processing for the data type.	
description	A brief description of the data type, such as "Address Standardization".	

Element Description	Attribute
parameter	A parameter for the configuration resource. By default, “fields” is the name of the parameter, and it is populated with a list of standardized field component names.
name	The name of the parameter.
value	One or more values for the parameter.

Creating Custom FSM-Based Variants

The flexible framework of the OHMPI Standardization Engine allows you to define new FSM-based variants on existing FSM-based data types so you can standardize different categories of the same type of data. For example, you might need to standardize names from several different countries. Variants are easily incorporated into a master person index project and can be made globally available to all projects. Perform the following steps to create a custom variant.

- [Creating the Working Directory](#) on page 5-5
- [Defining the Service Instance](#) on page 5-5
- [Defining the Service Instance](#) on page 5-5
- [Creating Normalization and Lexicon Files](#) on page 5-7
- [Packaging and Importing the Variant](#) on page 5-8
- [Service Instance Definition File](#) on page 5-9

Creating the Working Directory

The working directory for custom variants requires a specific structure. At a minimum, the working directory will look similar to the following:

```
/WorkingDir
  serviceInstance.xml
  /resource
    standardizer.xml
```

The resource directory might also contain several normalization and lexicon files.

To Create the Working Directory

1. Create a working directory for the new variant.
2. In the new working directory, create a resource directory.
3. Continue to [Defining the Service Instance](#).

Defining the Service Instance

The serviceInstance.xml file for each variant defines the name of the variant, the data type it modifies, and additional Java class information.

To Define the Service Instance

1. Create a file named serviceInstance.xml at the top level of your working directory.

Tip: You can copy a service instance file from an existing variant in the data type to which you will add the new variant, and then modify it for the new variant.

2. Define values for the elements and attributes described in Service Instance Definition File.

This example defines a new Spanish variant to the PersonName data type.

```
<serviceInstance type="PersonName">
  <description>Person Name Standardization: Spain</description>
  <parameter name="dataType" value="PersonName" />
  <parameter name="variantType" value="SP" />
  <componentManagerFactory
    class="com.sun.inti.components.component.BeanComponentManagerFactory">
    <property name="stylesheetURL"
      value="classpath:/com/sun/mdm/standardizer/impl/standardizer.xsl"/>
    <property name="urlSource" >
      <bean class="com.sun.inti.components.url.ResourceURLSource">
        <property name="resourceName" value="standardizer.xml />
      </bean>
    </property>
  </componentManagerFactory>
</serviceInstance>
```

Note: The value you enter for the variantType parameter must match the name you want the variant to display in the Standardization folder of the master person index project.

3. Save and close the file.
4. Continue to [Defining the State Model and Processing Rules](#).

Defining the State Model and Processing Rules

The state model defines how the data is read, tokenized, parsed, and modified during standardization. The state model and processing rules are all defined in the standardizer.xml file.

Before you begin this step, determine the different forms in which the data to be standardized can be presented and how it should be standardized for each form. For example, name data might be in the form “First Name, Last Name, Middle Initial” or in the form “First Name, Middle Name, Last Name” and you need to account for each possibility. Determine each state in the process, and the input and output symbols used by each state. It might be useful to create a finite state machine model, as shown below. The model shows each state, the transitions to and from each state, and the output symbol for each state.

For more information about the FSM model, see [Learning About Custom FSM-Based Data Types and Variants](#) on page 5-1.

To Define the State Model and Processing Rules

1. In /WorkingDirectory/resource, create a new XML file named standardizer.xml.

Tip: You can copy the file from an existing variant in the data type to which you are adding the custom variant. Then you can modify the file for the new variant.

2. If the data you are processing does not need to be parsed, but only needs to be normalized, define normalization rules in the normalizer section of the file.

For more information, see [Data Normalization Definitions](#) on page 3-7 and [Standardization Processing Rules Reference](#) on page 3-8.

3. If the data you are processing needs to be parsed and normalized, define the state model in the upper portion of the file.

For information about the state model and the elements that define it, see [Standardization State Definitions](#) on page 3-2.

Note: The next several steps use the processing rules described in [Standardization Processing Rules Reference](#) on page 3-8. Some of these rules might require that you create normalization and lexicon files.

The next several steps use the processing rules described in [Standardization Processing Rules Reference](#) on page 3-8. Some of these rules might require that you create normalization and lexicon files.

4. In the inputSymbols section of the file, define each input symbol along with any processing rules.

For more information, see [Input Symbol Definitions](#) on page 3-4.

5. In the outputSymbols section of the file, define each output symbol along with any processing rules.

For more information, see [Output Symbol Definitions](#) on page 3-5.

6. In the cleanser section of the file, define any cleansing rules that should be performed against the data prior to tokenization.

For more information, see [Data Cleansing Definitions](#) on page 3-6.

7. If you created any rules that reference normalization or lexicon files, continue to [Creating Normalization and Lexicon Files](#) on page 5-7.

Creating Normalization and Lexicon Files

Lexicon files list the possible values for a field so the standardization engine can quickly and accurately recognize different field components. Normalization files list the nonstandard values that might be found in a field along with the standard version so the standardization engine can present a common form for the data. You need to create a file for each lexicon or normalization file you referenced from standardizer.xml.

For more information about normalization and lexicon files, see [Lexicon Files](#) on page 3-12 and [Normalization Files](#) on page 3-13.

To Create Normalization and Lexicon Files

1. For each normalization file you referenced in standardizer.xml, do the following:
 1. Create a text file in /WorkingDirectory/resource.

2. Save the file under the name you used to reference it from standardizer.xml.
3. In the file, enter a list of nonstandard values along with their standardized values, separating the nonstandard value from the standard value with a pipe (|) as shown below.

```
COR|COURT
CRT|COURT
CR.|COURT
CT|COURT
CT.|COURT
DR|DRIVE
DR.|DRIVE
DRV|DRIVE
...
```

4. When you are finished, save and close the file.
2. For each lexicon file you referenced in standardizer.xml, do the following:
 1. Create a text file in /WorkingDirectory/resource.
 2. Save the file under the name you used to reference it from standardizer.xml.
 3. In the file, enter a list of all possible values for the field as shown below.

```
E
EAST
ET
N
NO
NORTH
NTH
S
SO
SOUTH
...
```

4. When you are finished, save and close the file.
3. Continue to [Packaging and Importing the Variant](#).

Packaging and Importing the Variant

Once you have created all the files for the variant, you need to package them into a ZIP file to be imported into a master person index application.

To Package and Import the Variant

1. In the working directory, select the folder and file at the top level and add them to a ZIP file.
2. Name the ZIP file the same name as the variant. This is the value you entered for the variantType parameter in [Defining the Service Instance](#) on page 5-5.

The ZIP file structure should be similar to the following. Note that this variant includes several normalization and lexicon files. Your variant might not contain any.

3. Import the file into a master person index application as described in *Oracle Healthcare Master Person Index Configuration Guide*.

Service Instance Definition File

Each data type variant is configured by a service definition file. Service type files define the fields to be standardized for a data type, and service instance definition files define the variant and Java factory class for the variant. Both files are in XML format.

Element	Description	Attribute
serviceInstance		A container element for the description and any parameters for the variant.
type		The name of the data type to which the variant belongs.
description		A brief description of the variant, such as "Person Names: Spain".
parameter		One parameter for the variant. The default variants contain two parameters, dataType, and variantType. The dataType parameter specifies the name of the data type to which the variant belongs. The variantType parameter specifies the name of the variant. For a master person index application, these are the names of the nodes that appear under the Standardization Engine node.
name		The name of the parameter.
value		The value of the parameter.
componentManagerFactory		The component manager factory class for the variant.
class		The name of the component manager factory class. The default class is com.sun.inti.components.component.BeanComponentManagerFactory.
property		A property of the component manager factory class. The default class has two properties. The stylesheetURL property defines the location of the stylesheet, standardizer.xml. The urlSource property defines the process definition file. Its value is a bean (by default, com.sun.inti.components.url.ResourceURLSource), which has a property called resourceName. The value for this property is standardizer.xml.
name		The name of the property.
value		The value for the property.

