



REFERENCE MODEL

The *openEHR* Data Structures Archetype Model

Editors: {T Beale, S Heard}¹, {D Kalra, D Lloyd}²

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1. Ocean Informatics Australia
 2. Centre for Health Informatics and Multi-professional Education, University College London

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Amendment Record

Issue	Details	Who	Date
0.5	CR-000019. Add HISTORY & STRUCTURE supertype. CR-000028. Change name of STRUCTURE class to avoid clashes.	T Beale H Frankel	03 Mar 2004
0.4.1	CR-000013. Rename key classes according to CEN ENV13606. CR-000041. Visually differentiate primitive types in openEHR documents.	S Heard, D Kalra, T Beale, D Lloyd	10 Oct 2003
0.4	CR-000003, CR-000004 changes. Changed package naming, improved heading structures. (Formally validated).	T Beale	20 Mar 2003
0.3	Removed existential invariants. Formally validated using ISE Eiffel 5.2.	T Beale	25 Feb 2003
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0.1	Taken from Common RM.	T Beale	11 Oct 2002

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1 Introduction

1.1 Purpose

This document describes the formal archetype semantics for the common data structures used in *openEHR* reference models. It is based on “The *openEHR* Data Structures Reference Model” version 1.0.

The intended audience includes:

- Standards bodies producing health informatics standards
- Software development groups using *openEHR*
- Academic groups using *openEHR*
- The open source healthcare community

1.2 Related Documents

Prerequisite documents for reading this document include:

- The *openEHR* Modelling Guide
- The *openEHR* Data Structures Reference Model

1.3 Status

This document is under development, and is published as a proposal for input to standards processes and implementation works.

The latest version of this document can be found in PDF and HTML formats at <http://www.openEHR.org/doculist.htm>. New versions are announced on openehr-announce@openehr.org.

1.4 Peer review

Known omissions or questions are indicated in the text with a “to be determined” paragraph, as follows:

TBD_1: (example To Be Determined paragraph)

Areas where more analysis or explanation is required are indicated with “to be continued” paragraphs like the following:

To Be Continued: more work required

Reviewers are encouraged to comment on and/or advise on these paragraphs as well as the main content. Please send requests for information to info@openEHR.org. Feedback should preferably be discussed on one of the appropriate mailing lists, openehr-technical@openehr.org or openehr-clinical@openehr.org.

2 Background

2.1 Requirements

2.2 Design Principles

3 The AM.DATA_STRUCTURE Package

3.1 Overview

The DATA_STRUCTURE archetype package contains two packages: the ITEM_STRUCTURE package and the HISTORY package. The first includes constraint classes for the Structure package classes, while the latter describes constraint classes for the History package classes. The DATA_STRUCTURE package is illustrated in FIGURE 1.

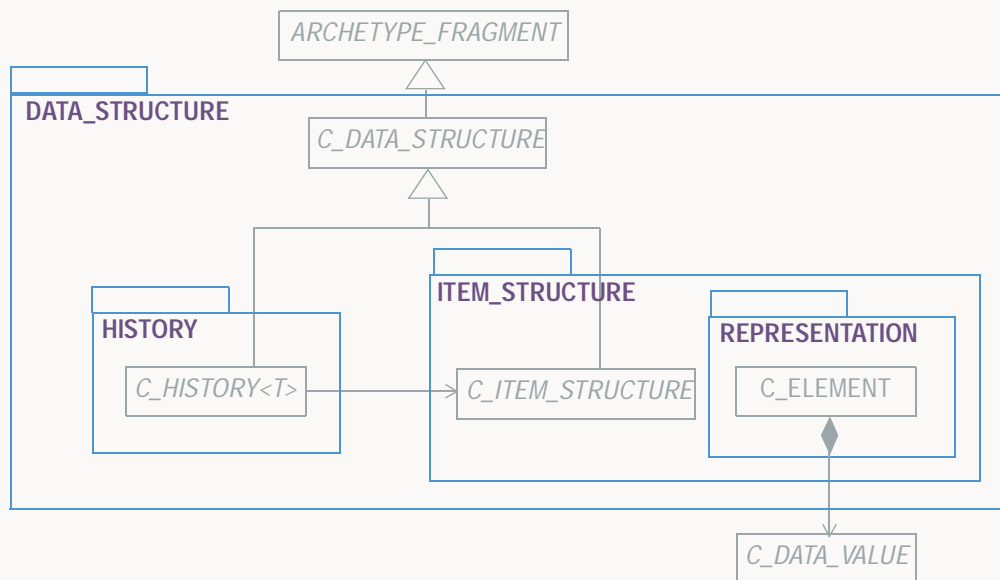


FIGURE 1 AM.DATA_STRUCTURE Package

4 AM.DATA_STRUCTURE.ITEM_STRUCTURE Package

4.1 Overview

The class model for the ITEM_STRUCTURE package is illustrated in FIGURE 2. The semantics of the classes define constraints for the corresponding reference model data structures, namely Tree, List, Table, Single and so on.

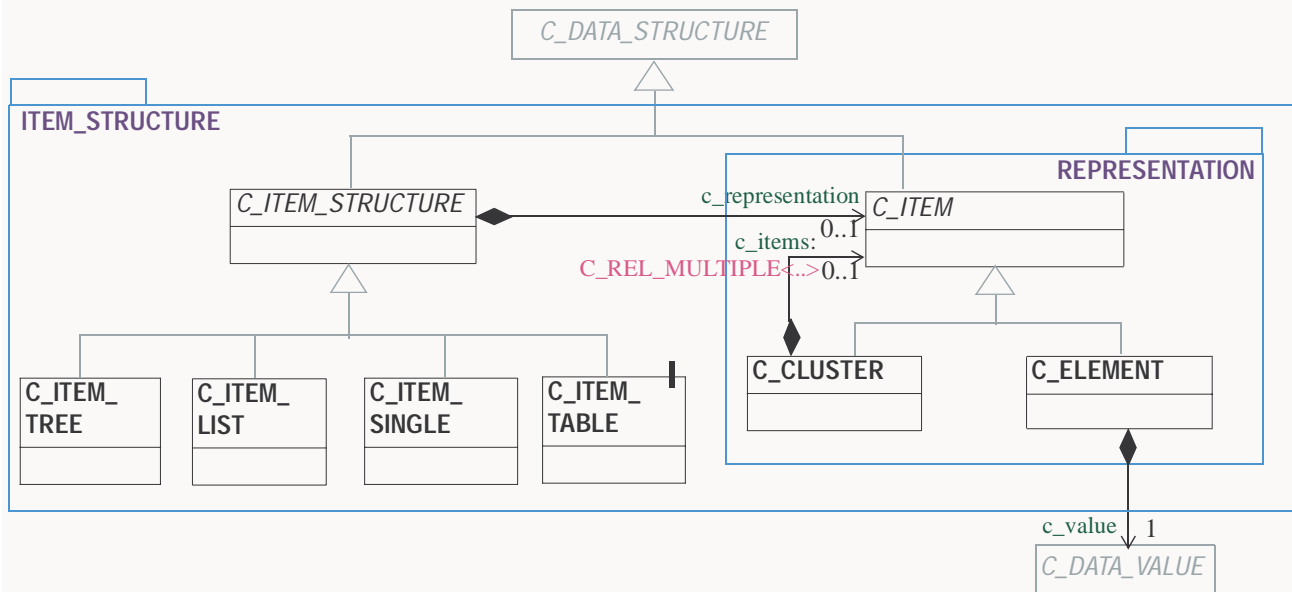


FIGURE 2 AM.DATA_STRUCTURE.ITEM_STRUCTURE Package

4.2 Class Descriptions

4.2.1 C_ITEM_STRUCTURE Class

CLASS	<i>C_ITEM_STRUCTURE (abstract)</i>	
Purpose	Abstract parent class of spatial data constraint types.	
Inherit	C_DATA_STRUCTURE	
Abstract	Signature	Meaning
	<i>c_representation</i> : C_ITEM	
Invariants	<i>c_representation_valid</i> : c_representation /= Void	

4.2.2 C_ITEM_SINGLE Class

CLASS	C_ITEM_SINGLE	
Purpose	Constrainer type for single values.	
Use	Used to represent any data which is logically a single value, such as a person's height or weight.	
Inherit	C_ITEM_STRUCTURE	
Attributes	Signature	Meaning
	+ c_item : C_ELEMENT	

4.2.2.1 C_ITEM_SINGLE Archetype Path

In the following path structure, the *meaning* of the C_ITEM_SINGLE object acts as the root-name.

- the item: " | " <C_ITEM_SINGLE.meaning>, e.g. " | weight "

4.2.3 C_ITEM_LIST Class

CLASS	C_ITEM_LIST	
Purpose	Constrainer structure for LIST_S objects.	
Use	Used to define constraints on clinical, demographic or other List_s structures, such as a measuring protocol or a multi-part street address.	
Inherit	C_ITEM_STRUCTURE	
Attributes	Signature	Meaning
	c_representation : C_CLUSTER	
	c_item_count : INTERVAL <Integer>	Constrain the number of items in a LIST_S.
	c_items : C_LIST <C_ELEMENT>	Constrain the actual members in a list.
Functions	Signature	Meaning
	c_names : C_LIST <C_DV_TEXT>	
Invariants		

4.2.3.1 C_ITEM_LIST Paths

In the following path structure for C_lists, the *meaning* attribute of the LIST_S object acts as the root-name.

- whole list: " | " <C_ITEM_LIST.meaning>, e.g. " | BP protocol "

- nth list item: "| " <C_ITEM_LIST.meaning> "| " "item="<n>,"
 e.g. "|BP protocol|item=2"
- named list item: "| " <C_ITEM_LIST.meaning> "| " <item.meaning>," e.g. "|BP protocol|cuff"

4.2.4 C_ITEM_TABLE Class

CLASS	C_ITEM_TABLE	
Purpose	Constrainer structure for TABLE_S objects.	
Use	Used to describe constraints for tabular data such as visual acuity result, or numerous other investigations results.	
Inherit	C_ITEM_STRUCTURE	
Attributes	Signature	Meaning
	c_representation: C_CLUSTER	
	c_row_count: INTERVAL<Integer>	Allowed number of rows
	c_column_count: INTERVAL <Integer>	Allowed number of columns
	c_row_names: C_LIST<C_DV_TEXT>	Required row names
	c_column_names: C_LIST<C_DV_TEXT>	Required column names
Invariants		

4.2.4.1 TABLE_S Paths

The following path patterns are legal for tables.

- whole table: "|<TABLE_S.name>," e.g. "|root"
- column: "|<TABLE_S.name>|<column-name>," e.g. "|vision|left eye"
- row: "|<TABLE_S.name>|<row-name>," e.g. "|vision|colour"
- cell: "|<TABLE_S.name>|<column-name>|<row-name>,"
 e.g. "|vision|left eye|acuity w/ glasses"

4.2.4.2 C_ITEM_TABLE Example

4.2.5 C_ITEM_TREE Class

CLASS	C_ITEM_TREE	
Purpose	Constrainer type for navigable tree structure.	
Inherit	C_ITEM_STRUCTURE	

CLASS	C_ITEM_TREE	
Attributes	Signature	Meaning
	c_representation: C_CLUSTER	
Functions	Signature	Meaning

4.2.5.1 C_ITEM_TREE Paths

Tree paths are of the following form.

- whole tree: "`|<TREE_S.name>`", e.g. "`|biochemistry`"
- node: "`|<TREE_S.name>|<node-name>...<node-name>`",
e.g. "`|biochemistry|lipid studies`"
- leaf value: "`|<TREE_S.name>|<node-name>...<node-name>|<leaf-name>`",
e.g. "`|biochemistry|lipid studies|LDL cholesterol`"

4.2.5.2 C_ITEM_TREE Example

5 AM.DATA_STRUCTURE.ITEM_STRUCTURE. REPRESENTATION Package

5.1 Overview

5.2 Class Descriptions

5.2.1 C_ITEM Class

CLASS	C_ITEM (abstract)	
Purpose	The abstract parent of C_CLUSTER and C_ELEMENT classes.	
Inherit	ARCHETYPE_FRAGMENT	
Attributes	Signature	Meaning

5.2.2 C_CLUSTER Class

CLASS	C_CLUSTER	
Purpose	The grouping variant of ITEM, which may contain further instances of ITEM, in an ordered list.	
Inherit	C_ITEM	
Attributes	Signature	Meaning
	items : C_LIST<C_ITEM>	Ordered list of items - C_CLUSTER or C_ELEMENT objects - under this C_CLUSTER.
Invariants	<i>c_items_valid</i> : items != Void <i>implies not</i> items.empty	

5.2.3 C_ELEMENT Class

CLASS	C_ELEMENT	
Purpose	Constrainer class for ELEMENT instances.	
Inherit	C_ITEM	
Attributes	Signature	Meaning

CLASS	C_ELEMENT	
	c_value : C_REL_SINGLE<C_DATA_VALUE>	Allowed data values of this leaf.
Invariants	<i>c_value_valid</i> : c_value /= Void	

6 AM.DATA_STRUCTURE.HISTORY Package

6.1 Overview

The HISTORY Package classes are shown in FIGURE 3. These classes express constraints for instances of HISTORY<T> and its descendants.

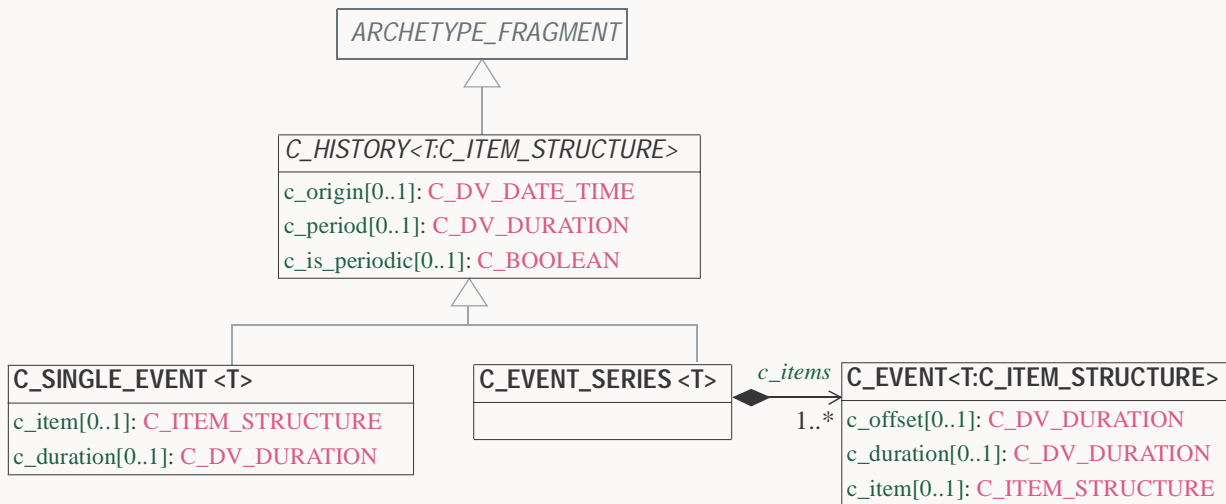


FIGURE 3 AM.DATA_STRUCTURE.HISTORY Classes

6.2 Class Descriptions

6.2.1 C_HISTORY<T> Class

CLASS	<i>C_HISTORY<T:C_ITEM_STRUCTURE></i> (abstract)	
Purpose	Constrainer class for instances of HISTORY.	
Inherit	C_ARCHETYPE_FRAGMENT	
Attributes	Signature	Meaning
	c_origin: C_DV_DATE_TIME	Constraint on when origin can occur. Almost never needs to be constrained.
	c_is_periodic: C_BOOLEAN	Constraint on whether series is periodic or not.
	c_period: C_DV_DURATION	Constraint on periodicity, if <code>c_is_periodic</code> includes the value True.
Invariants		

6.2.2 C_EVENT_SERIES<T:C_ITEM_STRUCTURE> Class

CLASS	C_EVENT_SERIES <T:C_ITEM_STRUCTURE>	
Purpose	Constrainer type for instances of EVENT_SERIES.	
Inherit	C_HISTORY<T>	
Attributes	Signature	Meaning
	c_items : C_LIST <C_EVENT<T>>	List of event constraints
Invariants		

6.2.3 C_EVENT<T:C_ITEM_STRUCTURE> Class

CLASS	C_EVENT<T:C_ITEM_STRUCTURE>	
Purpose	Constrainer type for instances of EVENT<T>.	
Inherit	ARCHETYPE_FRAGMENT	
Attributes	Signature	Meaning
	c_item : T	Constrainer for item allowed at this event position
	c_offset : C_DV_DURATION	Constrainer for offset of this event
	c_duration : C_DV_DURATION	Constrainer for duration of this event
Invariants		

6.2.4 C_SINGLE_EVENT<T:C_ITEM_STRUCTURE> Class

CLASS	C_SINGLE_EVENT<T:C_ITEM_STRUCTURE>	
Purpose	Constrainer for instances of SINGLE_EVENT<T>.	
Inherit	C_HISTORY<T>	
Attributes	Signature	Meaning
	c_item : T	Constrainer for item allowed at this event position
	c_duration : C_DV_DURATION	Constrainer for duration of this event
Invariants		

6.2.5 History Paths

History paths include the following possibilities:

- whole history by name: "|" C_HISTORY.name, e.g. "|history"
- whole history by time: "|origin=<dt>", e.g. "|origin=2001-05-10 16:45:00"
- event: "|" C_HISTORY.meaning "|" C_EVENT.meaning, e.g. "|history|event"

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A.1 General

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END OF DOCUMENT