

ADL Primer

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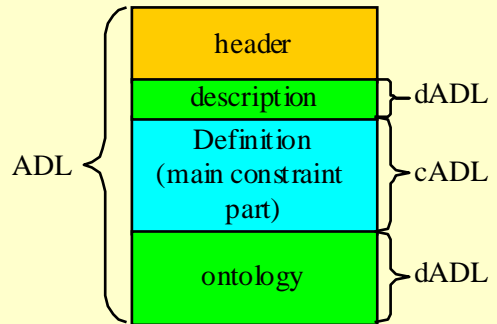


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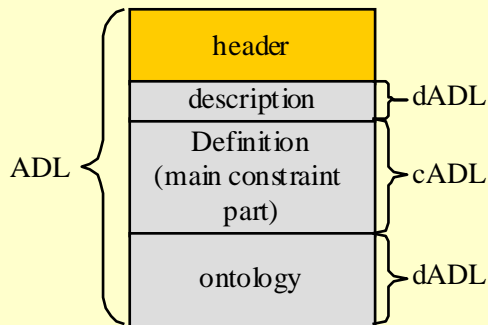
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ADL Document Structure



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ADL Header



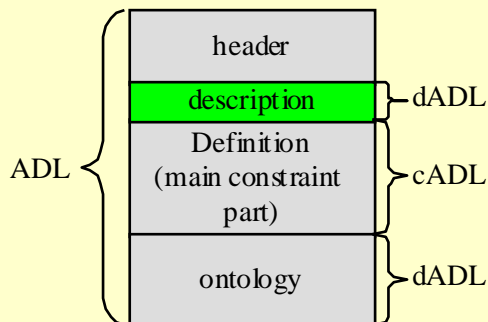
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Header

```
archetype
  some.archetype.id
specialises
  some.parent_arch.id
concept
  [at0000] -- term
```

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ADL Description



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Description (the meta-data)

```
description
author = <"Sam Heard <s.heard@littlerock.com">
submission = <
  organisation = <"WHO">
  date = <2003-12-20>
>
version = <"1.0">
status = <"draft">
revision = <"1.0">
description("en") = <
  purpose = <"Problem diagnosis evaluation">
  use = <"diagnosis description ..">
  misuse = <"differential diagnosis">
>
adl_version = <"1.0">
rights = <"© 2004 World Health Organisation">
```

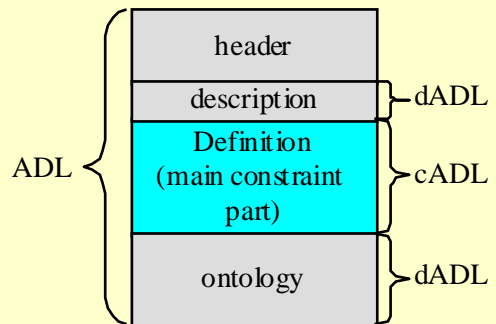
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Description continued...

- Actual model will conform to HL7 templates meta-data / Dublin Core, except that languages are supported properly
- ADL does not dictate the meta-data model

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ADL Definition



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Definition Section

- Main constraint definition of archetype
- Based on some reference model
- Syntax based on set membership
- Completely compatible with UML object meta-model
- Convertible to various formats
- Uses OCL for invariants

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Definition - overview

definition

```

TYPE_1 ∈ {
  attr_1 ∈ {
    TYPE_2 ∈ {
      attr_a ∈ {yyyy-mm-??}
      attr_b ∈ {|0.5..0.75|}
    }
  }
}

```

- Each occurrence of `XXXX ∈ {constraint}` is a specification of an *instance space* that the constrained data must fit into at runtime

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Definition – node identifiers

```

TYPE_1[at0002] ∈ {
  attr_1 ∈ {
    TYPE_2[at0005] ∈ {
      attr_a ∈ {yyyy-mm-??}
      attr_b ∈ {|0.5..0.75|}
    }
  }
}

```

- Node identifiers:
 - provide the domain meaning to each node
 - Are the basis of paths (multi-lingual & machine-processable)
 - Enable archetype nodes to be recorded in data
 - Defined in the ontology

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Definition – existence

```

ELEMENT[at0002] ∈ {
  value existence ∈ {0..1} ∈ {
    QUANTITY ∈ {...}
  }
}

```

- Specify existence for attributes: 0..1, 1..1 (I.e. optional or mandatory)
- Defaults to 1..1

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Definition – cardinality

```
LIST[at0002] ∈ {
  items cardinality ∈ {2..*} ∈ {
    ELEMENT[at0005] ∈ {..} -- systolic
    ELEMENT[at0006] ∈ {..} -- diastolic
    ELEMENT[at0099] ∈ {..} -- any
  }
}
```

- Specify cardinality to indicate container attributes
- Existence possible as well: means – does container exist at all (even empty)?

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Definition – occurrences

```
LIST[at0002] ∈ {
  items cardinality ∈ {2..*} ∈ {
    ELEMENT[at0005] occurrences ∈ {1..1} ∈ {..}
    ELEMENT[at0006] occurrences ∈ {0..1} ∈ {..}
    ELEMENT[at0099] occurrences ∈ {0..*} ∈ {..}
  }
}
```

- Occurrences indicates how many times a data element conforming to an archetype block may occur
- Default: 1..1

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Definition – basic leaf constraints

```
TEST[at0002] ∈ {
  string_attr1 ∈ {"something"}
  string_attr2 ∈ {/this|that|something else/}
  string_attr3 ∈ {/cardio.*}/

  string_attr4 ∈ {[ac0045]} -- see ontology

  boolean_attr1 ∈ {True}
  boolean_attr2 ∈ {False}
  boolean_attr3 ∈ {True, False}
}
```

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Definition – basic leaf constraints

```
TEST[at0002] ∈ {
  integer_attr1 ∈ {55} -- treated as an interval
  integer_attr2 ∈ {55, 75, 100}
  integer_attr3 ∈ {|0..100|}
  integer_attr4 ∈ {>= 10|}

  real_attr1 ∈ {0.0}
  real_attr2 ∈ {1.0, 2.0, 3.0}
  real_attr3 ∈ {|0.0..100.0|}
  real_attr4 ∈ {>= 10.0|}
  real_attr5 ∈ {|-10.0..-5.0|}
}
```

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Definition – date/time leaf constraints

```
TEST[at0002] ∈ {
  date_attr1 ∈ {yyyy-mm-dd}
  date_attr2 ∈ {yyyy-?-??}
  date_attr3 ∈ {yyyy-mm-??}
  date_attr4 ∈ {yyyy-?-XX}
  date_attr5 ∈ {1983-12-25}
  date_attr6 ∈ {2000-01-01}

  time_attr1 ∈ {hh:mm:ss}
  time_attr2 ∈ {hh:mm:XX}
  time_attr3 ∈ {hh:?:XX}
  time_attr4 ∈ {hh:?:??}
  time_attr5 ∈ {22:00:05.0}
}
```

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Definition – date/time leaf constraints

```
TEST[at0002] ∈ {
  date_time_attr1 ∈ {yyyy-mm-dd hh:mm:ss}
  date_time_attr2 ∈ {yyyy-mm-dd hh:mm:??}
  date_time_attr3 ∈ {yyyy-mm-dd hh:mm:XX}
  date_time_attr4 ∈ {yyyy-mm-dd hh:?:XX}
  date_time_attr5 ∈ {yyyy-?-?? ??:?:??}
  date_time_attr6 ∈ {1983-12-25 22:00:05.0}

  duration_attr1 ∈ {P0s}
  duration_attr2 ∈ {P1d}
  duration_attr3 ∈ {P2h5m}
  duration_attr4 ∈ {|P1h55m..P2h5m|}
  duration_attr5 ∈ {<= P1h|}
}
```

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Definition – invariants

```
TEST[at0002] ∈ {
  attr1 ∈ {
    QUANTITY ∈ {
      value ∈ {0..100}
    }
  }
  attr2 ∈ {
    QUANTITY ∈ {
      value ∈ {0..100}
    }
  }
  invariant
    attr1/value >= attr2/value
}
```

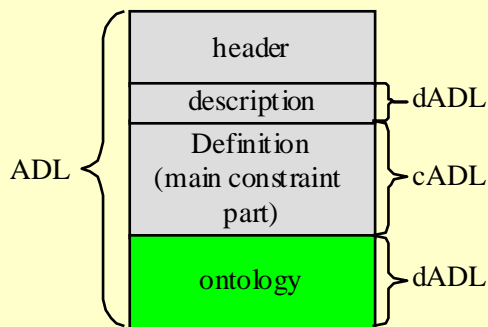
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Clinical Types

- Ordinals – [syntax](#); [example](#)
- Terms – [syntax](#); [example](#)

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ADL Ontology



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Ontology Section

- Contains local term definitions and bindings
- Managable in size
- Translations can be added without affecting main constraint definition
- Cost-effective to translate (cf all of snomed)
- Optional bindings, but not necessary

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Ontology - overview

```
primary_language = <"en">
languages_available = <"en", "de">
terminologies_available = <"snomed-ct", "loinc">

term_definitions("en") = <...>
constraint_definitions("en") = <...>
term_binding("en") = <...>
constraint_binding("en") = <...>
```

- Archetype authored in one language
- Translations have to be with respect to primary language (basis of translation)
- Bindings to multiple terminologies supported

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Ontology – term definitions

```
term_definitions("en") = < -- english
  items("at3121") = <
    text = <"Localised">
    description = <"Extent">
  >
  items("at3122") = <...>
>
term_definitions("tr") = < -- turkish
  items("at3121") = <
    text = <"Lokelize">
    description = <"Yayılım">
  >
  items("at3122") = <...>
>
```

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Ontology – constraint definitions

```
constraint_definitions("en") = < -- english
  items("at0005") = <
    text = <"patient position">
    description = <"patient position during
BP measurement">
  >
>
```

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Ontology – term bindings

```
term_binding("loinc") = <
  items("at1000") = <[loinc::700-0]>
  items("at1001") = <[loinc::718-7]>
  items("at1002") = <[loinc::718-7]>
  ...
>
term_binding("snomed") = <
  items("at0005") = <[snomed::20093944]>
  ...
>
```

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Ontology – constraint definitions

```
constraint_binding("snomed") = <
  items("ac0010") = <query("terminology",
"terminology_id = snomed_ct;
has_relation [102002] -- is-a
with_target [246153002]")-- auto-immune disease
>
```

- Connection between constraints and underlying ontologies
- Language of query not yet defined (others will define it)
- Typically only approximate
- Almost always partial coverage

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Summary

- ADL Formalism is simple and consistent
- Minor additions for Templates nearly complete
- Tools
 - OS Parsers for ADL, cADL, dADL exist
 - OS GUI archetype editor nearly complete

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