
Labeler and Ruleset Processing

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Presented at the PDS Technical Session – July 2003

The Need

- Help our data providers help us.
 - Allow novice users to generate quality labels for data products.
- Convert a large number of legacy labels to current standards.
 - Augment existing labels for use in the new on-line data system.
- Consolidate and standardize the tools used by our data engineers.
- Standardize our best approaches for generating labels.

Goals

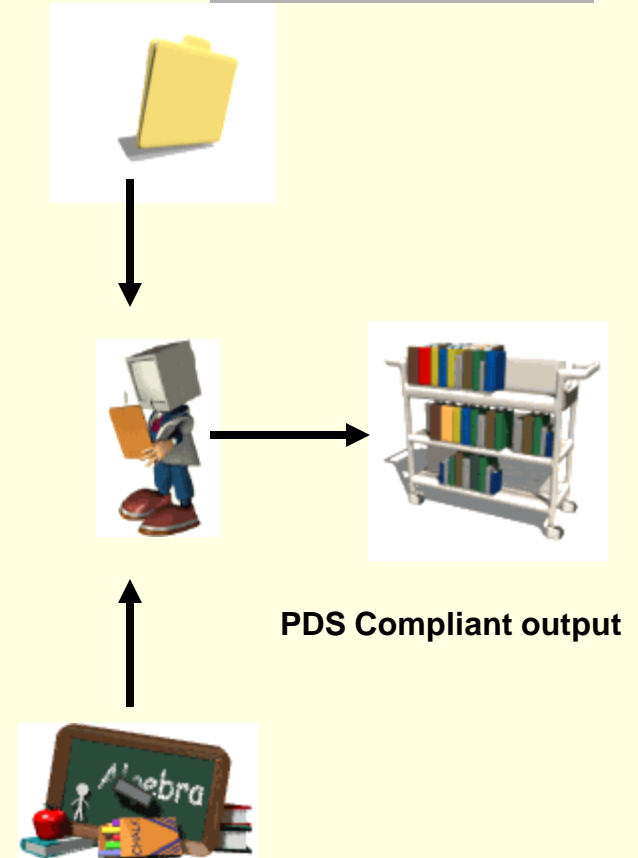
- To promote the delivery of PDS compliant products from missions and data providers.
- To be able to provide tools that data providers can use in-house and on their platform of choice to create labels for data products.
- To enable a PDS data engineer to design a label template and ruleset for the data provider.
- To have the ability to “plug-in” a service for new or unique applications.
- To be able to perform “upgrades” to existing data holdings.

The Approach

- Simple
 - Command line applications – no fancy interfaces. Mnemonic arguments.
- Portable
 - Core software written in Java. Real push to have all components written in Java.
- Extensible
 - Ability to add capabilities without modifying the core components.
- Minimal Restrictions
 - Extensions can be written in any language.

Framework

- Templates
 - A PDS label with unknown values set as variables.
 - Variables are replaced with information collected by the ruleset.
- Rulesets
 - Instructions on how to collect information about a specific data item.
 - Which template to use and where to write the resulting label.
- Plug-ins
 - Mini-applications, written in any language, that perform an external service (i.e, geometry processor, description formatter)
 - Return rulesets (values) to be processed and merged with the current ruleset.



Ruleset Language

A tag based language with flow control. Directives include:

`$variable = value` :: Define a *variable* and set to *value*.

`<RUN command>` :: Run a *command* and processes that output of the as a ruleset.

`<IF condition> <ELSEIF condition> <ELSE> </IF>` :: Branching

`<INCLUDE file>` :: Load and process ruleset in *file*.

`<IGNORE>` :: Stop processing file – do not produce output.

`<TEMPLATE file>` :: Use the *file* as the label template

`<OPTION name value>` :: Set *name* to specified *value*.

`<OUTPUT file>` :: When generating output, write to *file* (default: *base.lbl*)

`<MESSAGE text>` :: Write *text* to display.

`<ABORT>` :: Stop all processing.

`<COPY file dest>` :: Copy *file* to *destination*.

`<DUMP [stack]>` :: Output the contents of the named *stack*.

`<GLOBAL name value>` :: Set persistent variable *name* to *value*.

Note: Variables can be used in any argument or an assignment.

The Implementation

Written in Java.

Classes include:

PDSLabel: PDS label parser.

PPIOption: Command line option parser.

PPIRuleset: Ruleset processor.

PPITable: Delimited table parser.

PPITime: Time parser and formatter.

Labeler

- An application to run the ruleset processor within a file system.
- Can walk a tree and apply ruleset to each file at each level.
- Simple command line invocation. Syntax:

```
java labeler ruleset pathname
```

where ***ruleset*** is the file containing the ruleset to process and ***pathname*** is the directory or name of the file to process. If ***pathname*** is a directory, then all files in the directory and all sub-directories are processed.

Plug-ins - Current

Current set of plug-ins:

FormatDescription: Word wrap and indent text.

IMath: Perform simple integer math.

LabelValue: Extract a value from a label.

Lookup: Find a value in an interval lookup spreadsheet.

SpreadSheet: Parse files containing a spreadsheet (delimited text) and determine metrics.

Strings: Determine length, change case, index, and subset strings.

TabStartStop: Return a portion (column) of the first and last rows in an ASCII table.

TargetPhrase: Create a properly punctuated phrase describing a list a values.

Time: Parse and construct time strings in many formats.

Plug-ins under development

- p-chronos: A Plug-in which will call the SPICE chronos utility and format its output for use in a ruleset.

How it Works

Ruleset

```
<MESSAGE "This is a very simple example">

<TEMPLATE template.lbl>
<INCLUDE constant.rul>
<IF $FILE_EXT = "FFH">
    $DESCRIPTION = "This is a test"
<ELSEIF $FILE_EXT == "TXT">
    <IF $FILE_BASE = "README">
        <MESSAGE "This is the readme file.">
    <ELSE>
        <MESSAGE "This is another type of text
file.">
    </IF>
</IF>
<IGNORE>
<ELSE>
    <MESSAGE "Skipping all others: $PATH_NAME
($FILE_EXT)">
</IF>
```

constant.rul

```
$PDS_VERSION = PDS3
$DSID = DSID_1_0
$STD_PROD_ID = DATA
$PROD_TYPE = DATA
$REC_TYPE = FIXED
.
.
.
$COL_DESCR = "What?"
$HDR_BYTES = 80
$HDR_TPYE = FIXED
$HDR_DESCR = "This is the header file"
```

Template

```
PDS_VERSION_ID           = $PDS_VERSION
DATA_SET_ID              = "$DSID"
STANDARD_DATA_PRODUCT_ID = "$STD_PROD_ID"
PRODUCT_ID                = "$FILE_BASE"
PRODUCT_TYPE              = "$PROD_TYPE"
PRODUCT_CREATION_TIME     = $FILE_TIME

RECORD_TYPE               = $REC_TYPE
RECORD_BYTES              = $RECL
FILE_RECORDS              = $RECS

START_TIME                = $START_TIME
STOP_TIME                 = $STOP_TIME
SPACECRAFT_CLOCK_START_COUNT = "$START_SCLK"
SPACECRAFT_CLOCK_STOP_COUNT = "$STOP_SCLK"

INSTRUMENT_HOST_NAME      = "$HOST_NAME"
INSTRUMENT_HOST_ID        = "$HOST_ID"
ORBIT_NUMBER              = $ORBIT
TARGET_NAME               = $TARGET_LIST
INSTRUMENT_NAME           = "$INST_NAME"
INSTRUMENT_ID             = "$INST_ID"
DESCRIPTION                = "
$STD_PROD_DESCR"

NOTE                      = "
$FF_ABSTRACT"

^TABLE                    = "$FILE_BASE.FFD"
OBJECT                    = TABLE
    INTERCHANGE_FORMAT    = "$INTERCHANGE"
    ROWS                   = $RECS
    COLUMNS               = $COLS
    ROW_BYTES              = $RECL
    ^STRUCTURE             = "$FMT"
    DESCRIPTION            = "
    $COL_DESCR"
END_OBJECT                = TABLE

^HEADER                    = "$FILE_BASE.FFH"
OBJECT                    = HEADER
    BYTES                  = $HDR_BYTES
    HEADER_TYPE            = "$HDR_TPYE"
    DESCRIPTION            = "$HDR_DESCR"
END_OBJECT                = HEADER
END
```

How it Works

Label

```
PDS_VERSION_ID           = PDS3
DATA_SET_ID              = "DSID_1_0"
STANDARD_DATA_PRODUCT_ID = "DATA"
PRODUCT_ID               = "EXAMPLE"
PRODUCT_TYPE             = "DATA"
PRODUCT_CREATION_TIME    = 2003-04-17T11:05:02

RECORD_TYPE              = FIXED
RECORD_BYTES            = 64
FILE_RECORDS            = 10

START_TIME              = 2002-10-6
STOP_TIME               = 2003-01-12
SPACECRAFT_CLOCK_START_COUNT = "2400:0"
SPACECRAFT_CLOCK_STOP_COUNT = "2500:0"

INSTRUMENT_HOST_NAME    = "Galileo"
INSTRUMENT_HOST_ID     = "GLL"
ORBIT_NUMBER            = 1024
TARGET_NAME             = JUPITER
INSTRUMENT_NAME         = "MAG"
INSTRUMENT_ID          = "MAG"
DESCRIPTION              = "
    This is a short description"

NOTE                    = "
    This is a much longer multi-line type description which
    spans multiple
    lines."

^TABLE                  = "EXAMPLE.FFD"
OBJECT                  = TABLE
    INTERCHANGE_FORMAT  = "ASCII"
    ROWS                 = 10
    COLUMNS             = 4
    ROW_BYTES           = 64
    ^STRUCTURE          = "Unknown"
    DESCRIPTION         = "
        This the the description of a column from setvars.bat"
END_OBJECT              = TABLE

^HEADER                 = "EXAMPLE.FFH"
OBJECT                  = HEADER
    BYTES                = 80
    HEADER_TYPE         = "FIXED"
    DESCRIPTION         = "This is the header file"
END_OBJECT              = HEADER
END
```

How We Are Using Labeler

- Add keywords to existing labels.
- Upgrade labels to current standards.
- Generate labels for new data products.
- Update keyword values (i.e., improved ephemeris or pointing information)

Where to get it...

- <http://www.igpp.ucla.edu/pds/>

