Machine Readable Profiles

DMTF Profile Infrastructure WG

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Disclaimer

- **The information in this presentation represents a snapshot of work in progress within the DMTF.**
- **This information is subject to change. The Standard Specifications remain the normative reference for all information.**
- **For additional information, see the Distributed Management Task Force (DMTF) Web site.**

The DMTF was formed to lead the development, adoption and unification of management standards and initiatives for desktop, enterprise and internet environments

Overview on this session

Machine Readable Profiles (MRP)

- Explanation of what machine readable profiles are
- Motivation to introduce a machine readable format
- Overview on MRP standards and current status of standardization
- How to transition paper profiles to use the MRP format
- Rendering of MRP profiles as paper profiles
- Introduction into XML format of MRP profiles
- How to start with MRP

What are machine readable profiles ?

- **Machine Readable Profiles (MRP) is an XML format for DMTF profiles**
- **A profile in MRP format describes everything a "paper profile" describes:**
  - the "logical profile" (classes, etc.)
  - document related information (bibliography, conventions, etc.)
- **The MRP format fully supports DSP1001 1.1**
  - DSP1001 = Profile Usage Guide, aka "PUG"
- **The MRP format can be used for any profiles compliant to DSP1001 1.1**
  - regardless of owning organisation (e.g. DMTF, SNIA, vendors)

Information in a profile

- **Both MRP profiles and "paper profiles" contain these two types of information:**

"logical profile" related:

- Profile attributes
- Scoping algorithm
- CIM schemas
- Synopsis
- Description
- Related profiles
- Referenced message & metric registries
- Features
- Class adaptations (with requirements on properties, methods, operations, ...)
- Use cases

document related:

- Title page
- Copyright
- Foreword
- Document conventions
- Acknowledgements
- Normative references
- Scope
- Terms and definitions
- Symbols and abbreviations
- Bibliography
- Change history

Motivation for MRP

- **Easier for profile authors**
  - Context driven selection of admissible elements
  - Validation of profile elements
    - against CIM schema, DSP1001 1.1 rules, between profile elements
  - Much shorter than paper profiles
  - A lot of the text written in paper profiles is now generated

- **Easier for profile implementers**
  - Effects of multiple profiles can be merged by tooling
    - "profile merge" algorithm defined in DSP1001 1.1

- **Generation of implementation artefacts from the MRP profile**
  - Stubs for server side instrumentation (e.g. providers)
  - Simple test code (based on profile definition)
  - Client side proxy layers
  - Implementation MOF
  - Various kinds of documentation

- **MRP is the basis for machine readable test cases, providing for:**
  - Generic test case driver using machine readable test cases as input
  - Verify consistency of machine readable test cases with MRP profiles
  - Analyze test coverage of machine readable test cases

- **MRP work drives formalization of DSP1001 1.1**
  - Some newly described profile concepts (e.g. features, class adaptations)
  - Profile merge algorithm
  - Separation of :
    - logical profile requirements -> apply to both MRP and paper profiles
    - profile specification requirements -> apply to paper profiles only

Some newly described concepts in DSP1001 1.1: Features

Features

- Address the need to define optional functionality that affects a number of profile elements
- Typical solution before features:
  - one of the profile elements is defined as optional
  - the other affected elements are defined as conditional on the implementation of the optional element
- This leads to a clumsy style, it is hard to see what the optional decision is and what its consequences are
- Solution with features:
  - The optional decision and what it means is described as a feature
  - Detection of the feature implementation by a client is described along with that
  - Elements affected by the feature get connected to the feature by defining them as conditional on implementation of the feature, or by defining constraints based on implementation of the feature
- Not a new concept, just a different way to describe the same situation
- Leads to a structure that is easier to understand
- Well suited for MRP
- Example: The Fan Profile V1.0 was found to define about 10 features (fan capabilities, fan redundancy, fan speed sensoring, fan state management, etc.), partly hidden in prosa text.

Some newly described concepts in DSP1001 1.1: Class adaptations

Class adaptations

- New term for "profile class" (or sometimes just "class") in current profiles
- A class adaptation is the usage of a schema class in the profile context

- Have a formal name
  - Provides a cleaner way to use the same schema class multiple times in the same profile
  - Solution before named adaptations: Add some descriptive text in parenthesis after the class name, e.g. "CIM_ComputerSystem (host system)"

- Have the ability to define "base adaptations"
  - Allows pointing from an adaptation to other adaptations whose requirements also need to be satisfied by the implementation of that adaptation
  - Solution before base adaptations: Implementation had to figure out which profile classes (in different profiles) belong to the same class implementation

MRP standards

- **DSP1001.pdf (v1.1) – Profile Usage Guide**
  - Defines the profile concepts represented by MRP
- **DSP8028.xsd – Management Profile XML Schema**
  - Annotated XML schema
- **DSP8029.xsl – Management Profile Print XSLT Stylesheet**
  - Converts an MRP XML document to HTML
- **DSP2023.zip – Management Profile XML Samples**
  - XMP6013 – Example Fan Profile
    - Exact representation of DSP1013 1.0
    - Extended by a demonstration of indications, metrics, error messages
  - XMP6009 – Example Sensor Profile
    - Exact representation of DSP1009 1.0
  - XMP6011 – Example Physical Asset Profile
    - Exact representation of DSP1011 1.0
  - XMP6033 – Example Profile Registration Profile
    - Exact representation of DSP1033 1.0
- **DSP8050/8051/8052/8053.xsd – Common document related XML schemas**
- **DSP8054.css – Common document related CSS stylesheet**

Status of MRP work

- **Upcoming public release:**
  - Work in Progress release 1.0.0c (12/2010)
- **Next step:**
  - Rollout of version 1.0.0 as DMTF Standard:
    - DMTF Member Review targeted to start early 2011
- **DMTF work group defining MRP:**
  - DMTF Profile Infrastructure WG
  - http://www.dmtf.org/apps/org/workgroup/mrprofiles/
  - Post a message: mrprofiles@dmtf.org
  - Contact the WG chair: mrprofiles-chair@dmtf.org

Why did it take so long ?

- **Public MRP releases so far:**
  - 0.9.1 (11/2008) 1st Work in Progress (WiP) release
  - 0.9.3 (5/2009) 2nd WiP release
  - 1.0.0a (2/2010) 3rd WiP release
  - 1.0.0b (5/2010) 4th WiP release

- **Upcoming releases:**
  - Work in Progress release 1.0.0c (12/2010)
  - 1.0.0 Standard (1Q2011)

- **Reasons for taking so long:**
  - Parallel verification with real profiles
  - Parallel development of DSP1001 (PUG) 1.1
  - Bandwidth of contributors

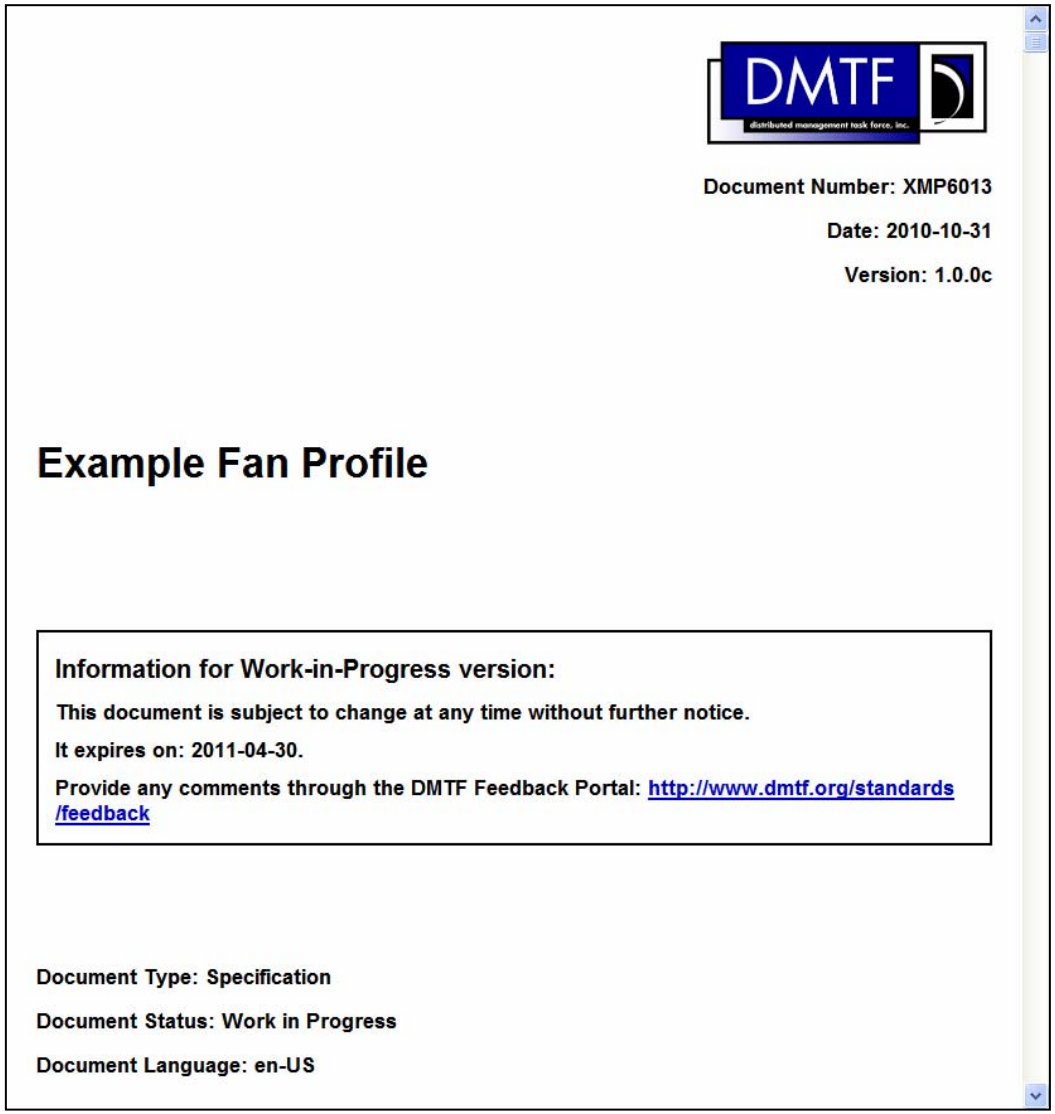
Transitioning to MRP

- **MRP profiles published by DMTF are in the new DSP6xxx number range**
  - DSP6xxx numbers correspond to DSP1xxx numbers (for "paper profiles")
  - Example: DSP6013 is MRP format of DSP1013 paper format
- **Usage of MRP format vs. paper format can be decided for each profile separately**
  - Related profiles can be a mix of MRP profiles and paper profiles
- **Typical transition scenarios:**
  - **New profile in MRP**
    - Owning group decides to use MRP for a new profile
    - A new DSP6xxx number gets allocated
    - The MRP profile is published as DSP6xxx.xml 1.0.0
  - **Transition of existing profile to MRP**
    - Owning group decides that from profile version 2.x.x on, MRP is used
    - A DSP6xxx number gets allocated, corresponding to the existing DSP1xxx number
    - MRP profile is published as DSP6xxx.xml 2.0.0
    - Transition to MRP can also happen on a minor version boundary
- **In both scenarios, a paper profile can be published in addition:**
    - The DSP8029 stylesheet is used to generate a HTML version of the MRP profile
    - The HTML version is published as DSP1xxx.html

Rendering MRP profiles as paper profiles

- **DSP8029.xsl – Management Profile Print XSLT Stylesheet**
  - Converts an MRP XML document to HTML 4.0
- **HTML output**
  - Can be viewed, printed, imported into word processing tools
  - Uses the styles and fonts used by DSP1000 (doc. template)
  - Has the look and feel of paper profiles!
- **Usage modes**
  - HTML output can be generated on the fly by the browser opening an MRP XML document, if the stylesheet XML processing instruction in the MRP profile is enabled
  - HTML output can also be persisted as a file, using XSLT processors (e.g. Xalan)
- **Customization of styles and fonts used**
  - Styles and fonts used in HTML output are defined in a CSS stylesheet DSP8054.css
  - Can be customized by other organizations to match their needs (e.g. SNIA, vendors)

DSP8029-generated example profile



DMTF

distributed management task force, inc.

Document Number: XMP6013

Date: 2010-10-31

Version: 1.0.0c

Example Fan Profile

Information for Work-in-Progress version:

This document is subject to change at any time without further notice.

It expires on: 2011-04-30.

Provide any comments through the DMTF Feedback Portal: http://www.dmtf.org/standards/feedback

Document Type: Specification

Document Status: Work in Progress

Document Language: en-US

Title page

Renders machine readable information about the profile document

MRP XML: High level structure

```
<mrp:ManagementProfile
    xmlns="http://www.w3.org/1999/xhtml"
    xmlns:mrp="http://schemas.dmtf.org/wbem/mgmtprofile/1"
    xmlns:cdc="http://schemas.dmtf.org/document/control/1"
    xmlns:cdr="http://schemas.dmtf.org/document/reference/1"
    xmlns:cdg="http://schemas.dmtf.org/document/glossary/1"
    xmlns:ct="http://schemas.dmtf.org/document/commontypes/1"
    xmlns:xhtml="http://www.w3.org/1999/xhtml"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="http://schemas.dmtf.org/wbem/mgmtprofile/1  dsp8028_1.0.xsd"

    <cdc:DocumentControlInformation> . . .
    <cdr:NormativeReferences> . . .
    <cdr:Bibliography> . . .
    <cdg:TermsAndDefinitions> . . .
    <cdg:SymbolsAndAbbreviations> . . .

    <mrp:ProfileAttributes> . . .
    <mrp:ProfileScope> . . .
    <mrp:Schemas> . . .
    <mrp:Synopsis> . . .
    <mrp:Description> . . .
    <mrp:RelatedProfiles> . . .
    <mrp:MessageRegistries> . . .
    <mrp:MetricRegistries> . . .
    <mrp:Features> . . .
    <mrp:Elements> . . .
    <mrp:Actors> . . .
    <mrp:UseCases> . . .

</mp:ManagementProfile>
```

Profile document related information

Logical profile related information

MRP XML: Rich text

Any descriptive text in MRP uses XHTML 1.1

- XHTML is basically HTML that conforms to XML rules.
- XHTML 1.1 is a W3C Recommendation

Example description using XHTML:

```
<mrp:Description>
  <mrp:XHTMLWithLinks>
    <img alt="DMTF collaboration diagram" src="XMP6013_1.0-Fig1.png"/>
    <p>The logical aspect of fans in the managed environment is
       represented by instances of the
       <mrp:ClassAdaptationLink>Fan</mrp:ClassAdaptationLink>
       adaptation. The system elements cooled by these fans are
       represented by associated
       <mrp:ClassAdaptationLink>CooledElement</mrp:ClassAdaptationLink>
       instances.</p>
    . . .
  </mrp:XHTMLWithLinks>
</mrp:Description>
```

MRP XML: Links in rich text

- **MRP supports links in XHTML text**
- **Links can target the following MRP profile elements:**
  - Terms, symbols
  - Normative references, bibliography entries
  - Related profile references
  - Metric & message registry references
  - Features
  - Class adaptations, properties, methods, parameters & return values, operations
  - Use cases
- **The targeted elements can be in the same or another MRP profile!**

  -> Profiles can be linked at the desired granularity

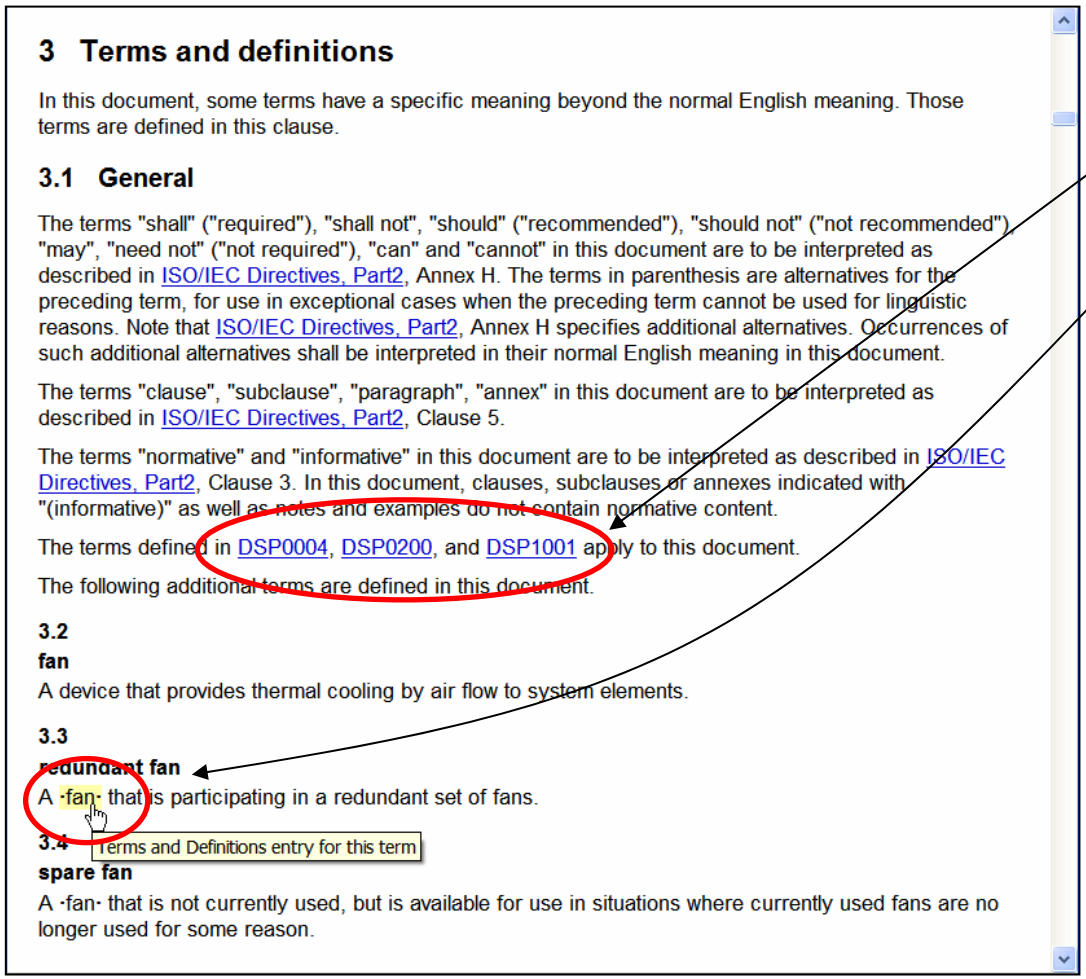
  Not just at document level granularity, as with paper profiles
- **Examples:**
  - Link to class adaptation in same profile:

    ```
    <mrp:ClassAdaptationLink>MyAdaptation</mrp:ClassAdaptationLink>
    ```
  - Link to class adaptation in another profile:

    ```
    <mrp:ClassAdaptationLink
    profileRefName="OtherProfile">OtherAdaptation</mrp:ClassAdaptationLink>
    ```

    where `profileRefName` is the MRP-internal name of the reference to the other profile.

DSP8029-generated rendering of links



3 Terms and definitions

In this document, some terms have a specific meaning beyond the normal English meaning. Those terms are defined in this clause.

3.1 General

The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"), "may", "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described in ISO/IEC Directives, Part2, Annex H. The terms in parenthesis are alternatives for the preceding term, for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that ISO/IEC Directives, Part2, Annex H specifies additional alternatives. Occurrences of such additional alternatives shall be interpreted in their normal English meaning in this document.

The terms "clause", "subclause", "paragraph", "annex" in this document are to be interpreted as described in ISO/IEC Directives, Part2, Clause 5.

The terms "normative" and "informative" in this document are to be interpreted as described in ISO/IEC Directives, Part2, Clause 3. In this document, clauses, subclauses or annexes indicated with "(informative)" as well as notes and examples do not contain normative content.

The terms defined in DSP0004, DSP0200, and DSP1001 apply to this document.

The following additional terms are defined in this document.

3.2
fan
A device that provides thermal cooling by air flow to system elements.

3.3
redundant fan
A ·fan· that is participating in a redundant set of fans.

Terms and Definitions entry for this term

3.4
spare fan
A ·fan· that is not currently used, but is available for use in situations where currently used fans are no longer used for some reason.

Links in HTML output use:

- HTTP link style (blue underlined) for document references
- W3C link style (dot surrounded, yellow background when moved over) for all other elements

Syntax help with MRP XML

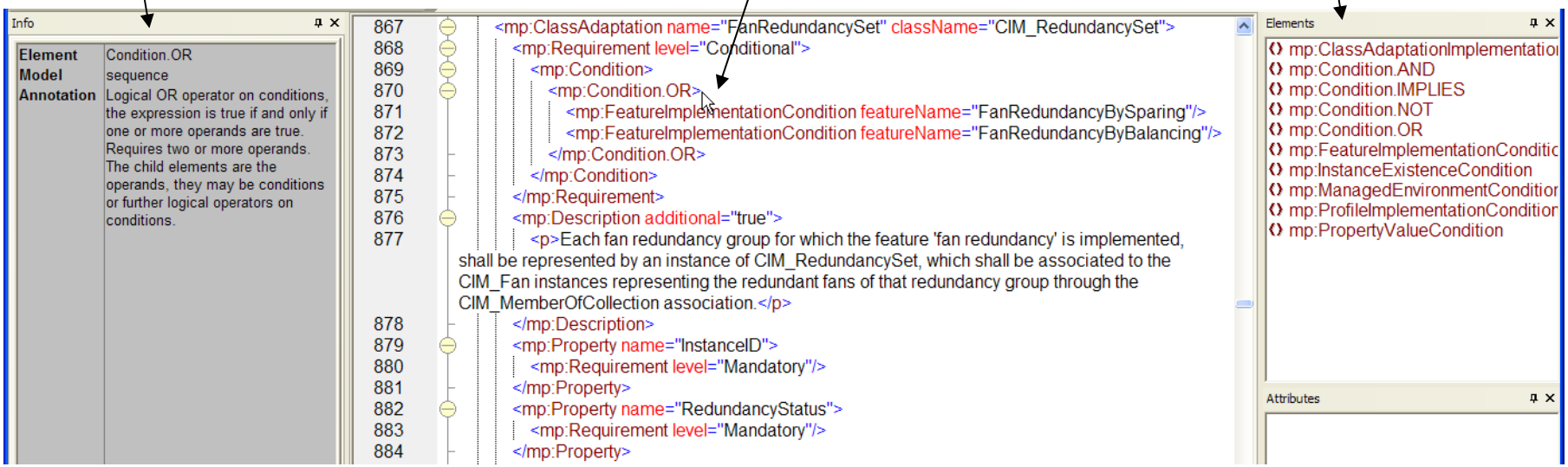
- **The MRP related XML schemas (DSP8028, DSP805x) are documented using <xsd:annotation> elements**
  -> Most XML editors show these annotations as help text

- **Most XML editors show the allowable XML elements and attributes for the current context**

Help text for that context (from XSD annotations)

Cursor, defining the context

Allowable elements and attributes for that context



MRP Tool Chain

Existing tools:

MRP Print Stylesheet (DSP8029)

Converts MRP XML file to HTML formatted paper profile

Ideas for additional tools:

MRP Editor

For MRP XML file definition / editing

Needs to be able to reach down to CIM Schema (in MOF or CIM-XML)

MRP Merge Tool

Produces the effective implementation MRP profile from two or more input MRP profiles

Implements the profile merge algorithm defined in DSP1001 1.1

MRP Implementation Specification Generator

Takes an implementation MRP profile (output of merge tool) and its underlying CIM schemas as input

Produces a (HTML?) design document that contains all information for the class implementations

MRP Client Documentation Generator

Takes an implementation MRP profile (output of merge tool) and its underlying CIM schemas as input

Produces a (HTML?) programming guide that contains all information for clients

MRP code generators for:

client proxy code

provider stubs

MRP Implementation Simulator

Simulate an implementation based on an implementation MRP profile and its underlying CIM schemas

Needs some form of variability definition as input

MRP Simple Test Tool

Drives tests that can be derived from the implementation MRP profile and its underlying CIM schemas

A more complete test tool would need machine readable test case definitions

Outlook: Machine Readable Testcases

- **Big next step:**
  - Machine Readable Test Cases ("MRTC"?)
  - On top of MRP & underlying CIM schemas

- **Drive automated compliance testing against MRP + MRTC**
  - Test coverage only limited by amount and quality of test cases

How to get started with MRP

- **Start with downloading the examples (DSP2023.zip)**
  http://www.dmtf.org/standards/published_documents/DSP2023_1.0.zip

- **The zip file contains a readme file that explains how to start:**
  - Viewing the sample MRP XML files in a Web browser
  - Using an XML Editor to edit the MRP XML files
  - Setting up an XSLT processor for generating the HTML output files

- **Real start: Write your own MRP profiles**
  - Starting fresh, using the XML Editor's syntax help capabilities
    - Ability to generate sample XML from XSD
  - By modifying an example profile from DSP2023

- **Implement some of the ideas of the MRP tool chain**

Summary & Take-aways

- Machine Readable Profiles are finally real!
  - **Functionally complete in 1.0.0c WiP release**
  - **1.0.0 DMTF Standard targeted for 1Q2011**

- MRP is based on DSP1001 (PUG) 1.1
  - **Exploits features, class adaptations, ...**
  - **Supports profile merging**

- MRP can be introduced very incrementally
  - **Paper profiles and MRP profiles can be mixed**
  - **Paper profiles in HTML format can be created from an MRP profile**

- Next steps:
  - **Finalization of MRP to 1.0.0 DMTF Standard**
  - **Start machine readable test cases**

-> Time for Q&A