Grupo de Especificação e Processamento de Linguagens

XML::DT - a Perl down translation module

José Carlos Ramalho
jcr@di.uminho.pt
José João Dias de Almeida
jj@di.uminho.pt

Grupo de Especificação e Processamento de Linguagens

Table of Contents

- XML::DT, what?
- Context of use
- Feature description
- Behind the scene
- Examples
- Future developments

Grupo de Especificação e Processamento de Linguagens

What was the motivation?

- project GEIRA
  - 30 museums; several libraries; 1 national archive; ...
  - XML documents are produced everyday:
    - Electronic news system
    - Catalog construction
    - Source documents
  - we have to generate several different formats for the same document
- Control over ...

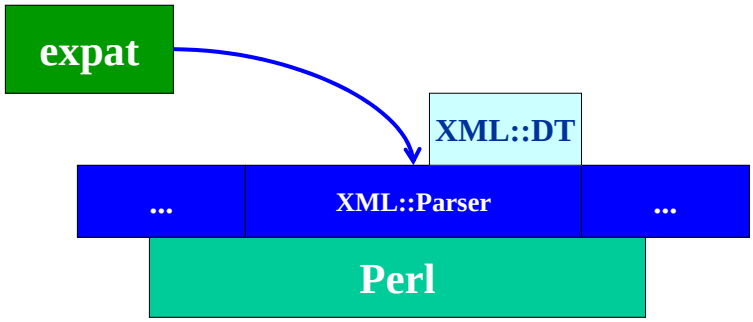
Grupo de Especificação e Processamento de Linguagens

XML::DT, what?

- a simple tool
  - easy to learn
  - with unlimited power !?
- to process down translations
- ... going towards a transformation tool

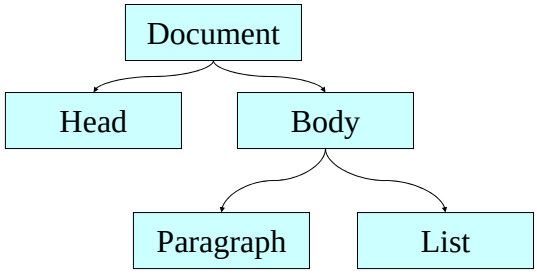
Grupo de Especificação e Processamento de Linguagens

XML::DT architecture



Grupo de Especificação e Processamento de Linguagens

Processing with XML::DT



Process(Document) = f(Process(Head), Process(g(Process(Paragraph), Process(List))))

With XML::DT:

- f, g = concatenation
- Expected result of Process is a string

Example 1: XML file

```
<?xml version="1.0" encoding="ISO-8859-1">
<article>
  <title>The XML Down Translator</title>
  <author>J. João Almeida</author>
  <author>José Carlos Ramalho</author>
  <keyword>XML</keyword>
  <keyword>language processing</keyword>
  <keyword>perl</keyword>
  <abstract>
    Once upon a time ...
  </abstract>
</article>
```

Example 1: DT file

```
1  #!/usr/bin/perl
2  use XML::DT ;
3  my $filename = shift;

4  %handler=(
5       '-outputenc' => 'ISO-8859-1',
6       '-default'   => sub{""},
7       'title'      => sub{"<b>$c</b>"},
8       'author'     => sub{"  <i>$c</i>"},
9       'article'    => sub{"$c<br>"}
10     );
11  print dt($filename,%handler);
```

Example 1: DT file

```
perl ex1.pl art.xml

<b>The XML Down Translator <
  <i> J.J. Almeida </i>
  <i> J.C. Ramalho </i>
<br>
```

$c - processed content
$q - element gi
$v{AttrName} - value of attribute
dt(arg1, arg2) - main down translation function

```
5     '-outputenc' => 'I
6     '-default'   => sub{""},
7     'title'      => sub{"<b>$c</b>"},
8     'author'     => sub{"  <i>$c</i>"},
9     'article'    => sub{"$c<br>"}
10    );
11  print dt($filename,%handler);
```


dt(arg1, arg2) function

- arg1 is the filename of the XML file or a string with XML content
- arg2 is a structure of the form:
  pattern => action
- patterns available
  '-default' - matches every element not matched in any other pattern
  '-outputenc' - by default is UTF8
  'element-gi' - triggers action for elements with that gi
  '-pcdata' - selects #PCDATA in mixed contents
  '-end' - processing to be applied to the transformed tree

Grupo de Especificação e Processamento de Linguagens

Is it hard to write? ...skelgen.pl

- Ex: perl skelgen.pl art.xml

```
#!/usr/bin/perl
use XML::DT ;
my $filename = shift;

%handler=(
#    '-outputenc' => 'ISO-8859-1',
#    '-default'   => sub{"<$q>$c</$q>"},
    'title' => sub{"$q:$c"},
    'author' => sub{"$q:$c"},
    'article' => sub{"$q:$c"},
    'abstract' => sub{"$q:$c"},
    'keyword' => sub{"$q:$c"},
);
print dt($filename,%handler);
```


Grupo de Especificação e Processamento de Linguagens

skelgen.pl

- Generates XML::DT
- It is programmed wit
- It shows a different u
- two

Analysis:

```
#!/usr/bin/perl
use XML::DT ;
my $filename = shift;
%xml=( '-default' =>
                  for (k

dt($filename,%xml);
```

Printing:

```
print <<'END';
#!/usr/bin/perl
use XML::DT ;
my $filename = shift;

%handler=(
#    '-outputenc' => 'ISO-8859-1',
#    '-default'   => sub{"<$q>$c</$q>"},
END

for $name (keys %element){
    print "     '$name' => sub{\"\$q:\$c\"},";
    print '# remember $v{',
          join('},$v{',keys %{$att{$name}}),
          '}' if $att{$name};
    print "\n";
}
print <<'END';
);
print dt($filename,%handler);
END
```

Grupo de Especificação e Processamento de Linguagens

skelgen.pl: future developments

- script will become a module function
- It will have a behavior switch to enable incremental processing:
  - if you add something to the structure of your XML file you do not need to hand code the new elements

Grupo de Especificação e Processamento de Linguagens

Ex2: Proceedings List of papers

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<proceedings>
  <title>XML Europe 99</title>
  <chair>Pam</chair>
  <abstract>
    Once upon a time in Granada ...
  </abstract>

  <article file="art1.xml"/>
  <article file="art2.xml"/>
  <article file="art3.xml"/>
</proceedings>
```

Grupo de Especificação e Processamento de Linguagens

Proceedings.pl

```
<H1>Proceedings:
 XML Europe 99</H1>
 <H2>Chair: Pam</H2>
 <b>The XML Down Translator<
    <I>J. JoÃ£o Almeida</I><BR
    <I>JosÃ© Carlos Ramalho</I>
<P>
 <b>The XML Parser</b><BR>
    <I>Clark Cooper</I><BR>
    <I>Larry Wall</I><BR>
<P>
  <b>The expat library</b><BR>
    <I>James Clark</I><BR>
<P>
```

```
#!/usr/bin/perl
use XML::DT ;
my $filename = shift;

%p_proc=(
    '-outputenc' => 'ISO-8859-1',
    '-default'   => sub{"$c"},
    'proceedings' => sub{"<H1>Proceedings: $c"},
    'title'      => sub{if(inctxt('proceedings')) {"$c</H1>"}
                    else {""}},
    'article' => sub{ dt($v{file}, %p_art) },
    'abstract' => sub{""},
    'chair' => sub{"<H2>Chair: $c</H2>"},
);

%p_art=(
    '-default'  => sub{""},
    'title'     => sub{" <b>$c</b><BR>"},
    'author'    => sub{"    <I>$c</I><BR>"},
    'article'   => sub{"<P>$c<P>"},
);

print dt($filename,%p_proc);
```


Grupo de Especificação e Processamento de Linguagens

Proceedings.pl

```
#!/usr/bin/perl
use XML::DT ;
my $filename = shift;

%p_proc=(
    '-outputenc' => 'ISO-8859-1',
    '-default'   => sub{"$c"},
    'proceedings' => sub{"<H1>Proceedings: $c"},
    'title'      => sub{if(inctxt('proceedings')) {"$c</H1>"}
                    else {""}},
    'article' => sub{ dt($v{file}, %p_art) },
    'abstract' => sub{""},
    'chair' => sub{"<H2>Chair: $c</H2>"},
);

%p_art=(
    '-default'  => sub{""},
    'title'     => sub{" <b>$c</b><BR>"},
    'author'    => sub{"    <I>$c</I><BR>"},
    'article'   => sub{"<P>$c<P>"},
);

print dt($filename,%p_proc);
```


dt can be used in a functional way

- enabling subdocument processing
- nested processing
- processor combination

Grupo de Especificação e Processamento de Linguagens

Context dependent processing

- ctxt(number)
  - Suppose we have: CONTEXT = "article/header/title"
  - ctxt(0) matches "title" ($q)
  - ctxt(1) matches "header"
  - ctxt(2) matches "article"
- inctxt(pattern)
  - inctxt('art.*') true if current element is under article and article is the top element
  - inctxt('proceedings | article') true if element is son of proceedings or article

match ←

LIFO structure

article/header/title

Grupo de Especificação e Processamento de Linguagens

Ex3: Adding a

What do we have? A set

```
<?xml version="1.0" encoding=
<article>
  <title>The XML Down Transl
  <author>J. João Almeida</aut
  <author>José Carlos Ramalho
  <keyword>XML</keyword>
  <keyword>language processin
  <keyword>perl</keyword>
  <abstract>
    Once upon a time ...
  </abstract>
</article>
```

What do we want?

Proceedings: XML Europe 99
Chair: Pam

The XML Down Translator
J. JoÃ£o Almeida
JosÃ© Carlos Ramalho

The XML Parser
Clark Cooper
Larry Wall

The expat library
James Clark

Keyword index

C++
The expat library

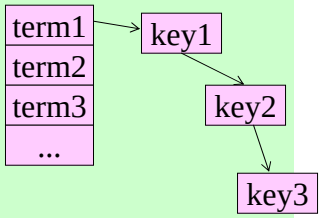
XML
The XML Down Translator
The XML Parser
The expat library

...

Grupo de Especificação e Processamento de Linguagens

Ex3: How?

```
sub mkKeyInd{
  my $r = "<H2>Keyword index</H2>";
  for $term (sort keys %ind)
    { $r .= "<P> <B>$term</B> $ind{$term}"; }
  $r
}
%p_proc=( ...
                'proceedings' => sub{"<H1>Proceedings: $c" .  mkKeyInd()},
... );
%p_art=( ...
    'title'     => sub{ $tit = $c; " <b>$c</b><BR>"; },
     'keyword'   => sub{ $ind{$c} .= "<BR>    $tit"; ""; }, ...
);
```



Grupo de Especificação e Processamento de Linguagens

The main algorithm

```
dt( document-handler, processor) =
    let tree = Parse(document-handler)
    in process( tree, processor)
       || processor{'-end'} (process( tree, processor))

process(PCDATA(p), processor) = p  ||  processor{'-pcdata'}(p)

process( element( e, sons ), processor ) =
    let args = concatenate( [ process( x, processor ) | x ← sons ] )
    in  if( e in domain(processor) then processor[e](args)
            else processor['-default'](args)
```

Grupo de Especificação e Processamento de Linguagens

Last example: gcapaper2tex.pl

```
%handler=(...
   '-pcdata' => sub{
      if(inctxt('(SECTION|SUBSEC1)')) {$c =~ s/[\s\n]+/ /g; $c }
         $c },
   ...
   'TITLE' => sub{
      if(inctxt('SECTION')){"\\section{$c}"}
     elsif(inctxt('SUBSEC1')){"\\subsection{$c}"}
      else  {"\\title{$c}"} },
   'AUTHOR' => sub{ push @aut, $c ; ""},
   'ABSTRACT' => sub{
      sprintf('\author{%s}\maketitle\begin{abstract}%s\end{abstract}',
         join ('\and', @aut) , $c) },
   'XREF' => sub{"\\cite{$v{REFLOC}}"},
... );
```


Grupo de Especificação e Processamento de Linguagens

New developments

- To Enable dt to create a data structure instead of a string:
  - a mapping: elementgi → content
- for a certain domain of actions
  - dt will generate a DSSSL/XSL specification
- To create the $utc
  - un-transformed-content

Grupo de Especificação e Processamento de Linguagens

Resources

- Web page
  - http://www.di.uminho.pt/~jj/perl/XML/DT.html
    - last version available for download
    - examples
    - documentation