How To Write A Minimal LaTeXML Binding

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1 Introduction

LaTeXhas been widely used as a document processor among scholars, especially when one needs to use large quantities of mathematical representations. LaTeX is also a good choice for those who are meticulous about typographical quality of documents.

As a page formatting tool, the primary output format of the LaTeX formatter is PDF; which – with fixed page formats and limited interaction features – is only partially suited for usage in the modern web. The DLMF (Digital Library of Mathematical Functions) developed LaTeXML, a flexible, semantics-preserving LaTeX to XML converter to fix this.

However, for every LaTeX class and package used in a document LaTeXML needs a **LaTeXML binding** – a configuration file that specifies the XML counterpart of the LaTeX command sequences provided by the respective class or package.

Even though the LaTeXML distribution provides bindings for the most commonly used classes and packages, the availability of bindings is still the most severe bottleneck for LaTeXML. The LaTeXML documentation [**LaTeXML:manual**] is mostly written for developers and quite impenetrable for beginners.

To encourage binding development this how-to tutorial goes through the steps and pitfalls of creating a LaTeXML class binding from scratch. This tutorial does not cover advanced topics related to LaTeXML, for which we refer to the LaTeXML manual [**LaTeXML:manual**].

We have developed a minimal document class `mockDoc` as an example for this how-to and will go through it step-by-step. All necessary files (and the development version of this tutorial)are available from [**mockDoc:git**], but are also included in the appendix of this document for reference.

This how-to tutorial is structured as follows: Section 2 briefly reviews LaTeXML workflows and the files involved.[1] Section 6 concludes the tutorial. EdN:1

2 Using LaTeXML

In this tutorial we we assume a working installation of LaTeXML– see [**LaTeXML:get**] for instructions – on a Unix-like system (Linux, Mac OS, etc.).

Given that, we use the command

```
latexmlc mockDoc.tex --format=XML --destination=mockDoc.xml --log=mockDoc.xml.log
latexmlpost --stylesheet=mockDoc.xsl -dest=mockDoc.html mockDoc.xml
```

for converting `mockDoc.tex` into `mockDoc.xml` and `mockDoc.xml` into `mockDoc.html`

The conversion from LaTeX to XML is processed by LaTeXML. Basically LaTeXML maps the LaTeX markups to the XML markups, more specifically: macros, primitives and constructors. The post-processing mechanism such as conversion to HTML and XHTML is done by passing the the documents through the post-processing filter modules.

---

[1]EdNote: MK: continue, when the struture is fixed

2.1 Things We Need

source Here we use `mockDoc.tex` as a minimal example[2] see appendix **??**[3]

(LaTeX class) we provide a LaTeX class `mockDoc.cls` for reference; sometimes it is useful to generate PDF for proofreading. The normal situation in developing LaTeXML bindings is that the class/package pre-exists. This file won't be illustrated in this tutorial.

LaTeXML binding the core issue of this tutorial. We use `mockDoc.cls.ltxml` – Section **??** for a step-by-step explanation and appendix A.2 for the end result.

RelaxNG schema LaTeXML needs a RelaxNG schema to infer the output structure. We supply it in compact form (`mockDoc.rnc`; see appendix A.3, which can be converted to the XML form LaTeXML needs (`mockDoc.rng`) via `trang.jar`. The reason for writing `mockDoc.rnc` instead of `mockDoc.rng` is that, `mockDoc.rnc` is much shorter and easier to maintain.

After we have finished writing all the documents above, run the command mentioned before, and then we should be able to see the converted XML file for `mockDoc.tex`. In the following chapters we will explain how to construct `mockDoc.rnc` and `mockDoc.cls.ltxml`

These workflows can be automated via a Unix `makefile` (see appendix B), which re-generates everything when source files have changed. Then only need to issue the command:

```
make
```

3 The mockDoc Format

3.1 A minimal Document Format

Actually our `mockDoc`format is probably the smallest one in the world, it is only intended for this tutorial.

The LaTeX class only provides one environment: `document` and four macros: `\section`, `\subsection`, `\paragraph`, and `\newline`. A minimal example would be

Listing 1: A Minimal LaTeX Document

```
\documentclass{mockDoc}
\begin{document}
      \section{A brief introduction about Shelley}
            Percy Bysshe Shelley (4 August 1792 -- 8 July 1822) was one of the
                major English Romantic poets, and is regarded by some critics
                as amongst the finest lyric poets in the English language.
      \section{Ode to the West Wind (partial)}
            \subsection{I}
                  \paragraph{1.}
                        O wild West Wind, thou breath of Autumn's being, \
                            newline
                        Thou, from whose unseen presence the leaves dead \
                            newline
                        Are driven, like ghosts from an enchante fleeing,
                  \paragraph{2.}
                        Yellow, and black, and pale, and hectic red,\
                            newline
                        Pestilence-stricken multitudes: O thou, \newline
                        Who chariotest to their dark wintry bed
                  \paragraph{3.}
                        The winged seeds, where they lie cold and low,\
                            newline
                        Each like a corpse within its grave, until \newline
```

---

[2] EDNOTE: MK: make a minimal one, use that here. Hang:are we saying we are not using mockDoc.tex as our minimal example throughout the howTo, or we are just creating a small code snippet to show the tex file?

[3] EDNOTE: make other references

```latex
                                    Thine azure sister of the Spring shall blow
                    \paragraph{4.}
                            Her clarion o'er the dreaming earth, and fill \
                                newline (Driving sweet buds like flocks to feed
                                 in air) \newline With living hues and odours
                                plain and hill:
                    \paragraph{5.}
                            Wild Spirit, which art moving everywhere; \newline
                                Destroyer and Preserver; hear, O hear!
                \subsection{II}
                    \paragraph{1.}
                            Thou on whose stream, 'mid the steep sky's
                                commotion, \newline
                            Loose clouds like Earth's decaying leaves are shed,
                                 \newline
                            Shook from the tangled boughs of Heaven and Ocean,
                    \paragraph{2.}
                            Angels of rain and lightning: there are spread \
                                newline
                            On the blue surface of thine airy surge, \newline
                            Like the bright hair uplifted from the head
                    \paragraph{3.}
                            Of some fierce Maenad, even from the dim verge \
                                newline
                            Of the horizon to the zenith's height, \newline
                            The locks of the approaching storm. Thou dirge
                    \paragraph{4.}
                            Of the dying year, to which this closing night \
                                newline
                            Will be the dome of a vast sepulchre \newline
                            Vaulted with all thy congregated might
                    \paragraph{5.}
                            Of vapours, from whose solid atmosphere \newline
                            Black rain, and fire, and hail will burst: O hear!
\end{document}
%%% Local Variables:
%%% mode: latex
%%% TeX-master: t
%%% End:
```

We want to use this document class for generating XML documents, which use the five elements `document`, `\section`, `\subsection`, `\paragraph`, and `\newline`. The XML document corresponding to the LaTeX document from Listing 1 is

Listing 2: A Minimal LaTeX Document

```xml
<?xml version="1.0" encoding="UTF-8"?>
<?latexml searchpaths="/Users/yuancalvin/xmlTrans/howTo"?>
<?latexml class="mockDoc"?>
<?latexml RelaxNGSchema="mockDoc.rng"?>
<mock:document xmlns:mock="https://kwarc.info/projects/mockDoc">
  <mock:section>
    <mock:title>A brief introduction about Shelley</mock:title>
    <mock:p>Percy Bysshe Shelley (4 August 1792    8 July 1822) was one of the
        major English Romantic poets, and is regarded by some critics as amongst
        the finest lyric poets in the English language.
</mock:p>
  </mock:section>
  <mock:section>
    <mock:title>Ode to the West Wind (partial)</mock:title>
    <mock:subsection>
      <mock:title>I</mock:title>
      <mock:paragraph>
        <mock:title>1.</mock:title>
        <mock:p>
O wild West Wind, thou breath of Autumn s being, <mock:break/>Thou, from whose
    unseen presence the leaves dead <mock:break/>Are driven, like ghosts from an
    enchante fleeing,
```

```
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >2. </mock:title >
        <mock:p>
Yellow , and black , and pale , and hectic red ,<mock:break/>Pestilence - stricken
    multitudes : O thou , <mock:break/>Who chariotest to their dark wintry bed
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >3. </mock:title >
        <mock:p>
The winged seeds , where they lie cold and low ,<mock:break/>Each like a corpse
    within its grave , until <mock:break/>Thine azure sister of the Spring shall
    blow
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >4. </mock:title >
        <mock:p>
Her clarion o e r the dreaming earth , and fill <mock:break/>( Driving sweet buds
    like flocks to feed in air ) <mock:break/>With living hues and odours plain and
    hill :
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >5. </mock:title >
        <mock:p>
Wild Spirit , which art moving everywhere ; <mock:break/>Destroyer and Preserver ;
    hear , O hear !
</mock:p>
      </mock:paragraph >
    </mock:subsection >
    <mock:subsection >
      <mock:title >II </mock:title >
      <mock:paragraph >
        <mock:title >1. </mock:title >
        <mock:p>
<!-- %**** mockDoc.tex Line 25 **** -->Thou on whose stream , mid the steep
    sky s commotion , <mock:break/>Loose clouds like Earth s decaying leaves are
    shed , <mock:break/>Shook from the tangled boughs of Heaven and Ocean ,
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >2. </mock:title >
        <mock:p>
Angels of rain and lightning : there are spread <mock:break/>On the blue surface of
    thine airy surge , <mock:break/>Like the bright hair uplifted from the head
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >3. </mock:title >
        <mock:p>
Of some fierce Maenad , even from the dim verge <mock:break/>Of the horizon to the
    zenith s height , <mock:break/>The locks of the approaching storm . Thou dirge
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >4. </mock:title >
        <mock:p>
Of the dying year , to which this closing night <mock:break/>Will be the dome of a
    vast sepulchre <mock:break/>Vaulted with all thy congregated might
</mock:p>
      </mock:paragraph >
      <mock:paragraph >
        <mock:title >5. </mock:title >
        <mock:p>
```

```
Of vapours , from whose solid atmosphere <mock:break/>Black rain , and fire , and hail
    will burst: O hear!
</mock:p>
      </mock:paragraph >
    </mock:subsection >
  </mock:section >
</mock:document >
```

[4]

Note the typical format-specific differences between the content-oriented LaTeX and more data-oriented XML formats. The sectioning is conveyed by macros in LaTeX – only giving the start cues (here the numbered section headings) – whereas the XML has start and end tags. In addition, LaTeX markup is less strict then XML markup, meaning LaTeX more suitable for somewhat messy human readable documents, whilst in XML not everything is allowed.

3.2 The RelaxNG Schema

Schema is a crucial document that decides how `mockDoc.xml` is constructed. When one is creating his now schema, the [**RelaxNG:tutorial**] and [**XML:tutorial**] are two good documentations to get started. One good approach to test this is to create our expected `mockDoc\_sample.xml` by hand, according to our `mockDoc.tex`, then compare `mockDoc\_sample.xml` with the generated `mockDoc. xml`. we can easily accomplish this by using *emacs nxml mode* [**Emacs:nxml**], in which we have the freedom to write our expected `mockDoc.xml`, while validating our `mockDoc.xml` at the same time. If validation fails, we can see the error message instantly, such that we can debug our `mockDoc.xml` or schema accordingly.

In our `mockDoc.rnc`:

```
document = element document {p, section *}
section = element section {title ,(p | subsection )*}
```

We can easily see that, under a `document`, there can be either `p` or `section`, and under a `section` there can be a `title` followed by `p` or a `title` followed by a `subsection`. This is because in the first section in `mockDoc.tex`:

```
\section{A brief introduction about Shelley}
    Percy Bysshe Shelley (4 August 1792 -- 8 July 1822)...
```

there is no `subsection` but texts directly. But in the other `sections`, there are `subsections`. In our schema we need to consider all kinds of possible hierarchy of our elements.

4 How to Create a LaTeXML Binding

We now come to the central part of our tutorial: writing the LaTeXML binding itself. Generally, a LaTeXML binding file is a Perl module – and therefore underlies Perl syntax, but special high-level commands simplify expressing the LaTeX-to-XML relation.

4.1 Basic structure

Since LaTeX binding is a perl module, we need to initialize a binding file by adding the followings in the beginning of `mockDoc.cls.ltxml`:

```
package LaTeXML :: Package :: Pool;
use strict ;
use LaTeXML :: Package ;
use warnings ;
```

At the end of `mockDoc.cls.ltxml`, don't forget to include

---

[4]EdNote: MK: actually, we should make an idealized minimal XML example by remove all the XML-isms from the generated one and show it here. Hang: I am confused about the notation of a minimal xml example, just like the the minimal tex file mentioned i n note 3

```
1;
```

to make sure that perl works properly.

4.2 Configure namespace

With:

```
RegisterNamespace('mock'=>"https://kwarc.info/projects/mockDoc");
RelaxNGSchema("mockDoc.rng",'mock'=>"https://kwarc.info/projects/mockDoc");
```

We declared the namespace associated the prefix `mock` with the namespace, and thus we can use the prefix when defining new macros to avoid name conflicts. The second lines tells LaTeXML that the generated xml should fit in our schema.

4.3 Linebreaks

The next task is to teach LaTeXML new commands used in `mockDoc.tex`. Here is an example:

```
DefConstructor('\newline',"<mock:break/>");
```

This line defines how LaTeXML interprets `\newline`, as we see, LaTeXML will translate `\newline` to `<mock:break/>` in `mockDoc.xml`.

4.4 Sectioning

When dealing with `section`, things get a little tricky, with:

```
DefConstructor('\section{}', "<mock:section><mock:title>#1</mock:title>");
```

we defined `\section`. But, think about the closing tags. In `mockDoc.tex`, we declared where the `\section` starts and where the next `\section` starts, nevertheless, we never wrote something like "Now close this section". Here is why we need `mockDoc.rnc`. This schema file tells LaTeXML what the structure of our document, and with:

```
Tag('mock:section', autoClose=>1);
```

LaTeXML will close the section tags (i.e, adding `</mock:section>`) whenever needed.

4.5 The Document Environment

We may think something like:

```
DefEnvironment('{document}', "<mock:document>#body</mock:document>");
```

is enough for defining `document` environment. We can try it, but we will find that all spaces disappear. What we actually wrote in `mockDoc.cls.ltxml` is:

```
DefEnvironment('{document}', "<mock:document>#body</mock:document>", beforeDigest
    => sub { AssignValue(inPreamble => 0); });
```

This code can prevent the error mentioned before, however, the mechanism of the `beforeDigest` part is out of our discussion in this tutorial.

For an environment, we don't need care about auto-closing, since an environment is always like

```
\begin{*environment-name*}
content...
\end{*environment-name*}
```

where `\end\{*environment-name*\}` will indicate where to close the tags.

4.6 Auto-opening for Paragraphs

Since we also want to write some texts directly under `document`, without any `section`. At this circumstance, we need auto-open for `p`:

```
Tag('mock:p', autoOpen=>1);
```

which will surround such texts.

We now have a complete set of tiles to generate our XML file. Simply by using makefile, we should be able to see the generated `mockDoc.xml` in our current directory. It should be something similar to we expected `mockDoc\_sample.xml`.

5 Postprocessing for Web Workflow

After we obtain `mockDoc.xml`, we can further utilize the power of LaTeXML to convert it into some other useful formats such as HTML, HTML5 and XHTML. LaTeXML by default provides us with stylesheets for this conversion, however we are given freedom to customize this process by creating our own XSL and CSS stylesheets.

5.1 XSL Stylesheet

Similar to how we create RelaxNG schema, in `mockDoc.xsl`

```
<xsl:template match="/">
  <html>
    <head>
      <xsl:comment>automatically generated, handle with care</xsl:comment>
    </head>
    <xsl:apply-templates/>
  </html>
</xsl:template>
```

we associate the template with the root of XML and then within the main structure, we tells LaTeXML to use other template when needed.

```
<xsl:template match="mock:section">
  <h1>
    <xsl:value-of select="mock:title" />
  </h1>
  <p>
    <xsl:value-of select="mock:p" />
  </p>
  <xsl:for-each select="mock:subsection">
    <h2>
      <xsl:value-of select="mock:title" />
    </h2>
    <xsl:for-each select="mock:paragraph">
      <h3>
        <xsl:value-of select="mock:title" />
      </h3>
      <p>
        <xsl:value-of select="mock:p" />
      </p>
    </xsl:for-each>
  </xsl:for-each>
</xsl:stylesheet>
</xsl:template>
```

In case of the section template, we let LaTeXML generate a section in HTML and then apply the templates for the macros that appear in `mock:section` from our `mockDoc.xml` file. Our `mockDoc.xsl` should be consistent with our `mockDoc.rnc` as they both define the structure of our documents, as we can see from the section definition in our `mockDoc.rnc`, they both contain: title, p and subsection elements.

```
section = element section {title ,(p |subsection )*}
```

6 Conclusion

The trick of using LaTeXML is to get familiar with all the necessary components that are required for different processing, for instance if we want to customize the conversion from XML to HTML, it is much helpful to know LaTeXML schema and XSLT and XHTML. LaTeXML allows a large degree of customizations which maximize the connivence of format conversion, particularly the conversion from `tex` to `xml`, as our prefer to use TeXfor production and XML for delivery. For a web workflow, where the ultimate goal is to generate HTML5, writing a document class from scratch may not be the most common workflow, since the majority of document classes in LaTeX are derived in some way from `article.cls` and therefore the LaTeXML bindings can inherit the from `article.cls.ltmxl`, but in some cases we want to use LaTeXML to generate other XML-based format. There we need the techniques in this tutorial. Examples are generating OMDoc from sTeX[5]

EdN:5

---

[5]EDNOTE: MK: cite them from kwarc.bib, are there others? Hang: .bib doesn't show after use printbibliography

A Appendix

A.1 The mockDoc Class

```
% File: doc.cls
% Author: Jinbo Zhang
% Date: 3 Feb, 2015

\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{mockDoc}
\RequirePackage{ifthen}

\renewcommand\normalsize{\fontsize{10pt}{12pt}\selectfont}
\setlength{\textwidth}{6.5in}
\setlength{\textheight}{8in}

\newcommand\large{\@setfontsize\large\@xiipt{14}}
\newcommand\Large{\@setfontsize\Large\@xivpt{18}}


% define \paragraph
\newcommand{\paragraph}[1]{
        \newline\newline
        \bfseries #1
        \normalfont
}

% define \section
\newcounter{SectionCount}
\newcommand{\section}[1]{
        \ifthenelse{\value{SectionCount}=0}{}{\newline\newline\newline}
        \Large
        \stepcounter{SectionCount}
        \noindent\bfseries\arabic{SectionCount}\hspace{4mm} #1
        \normalfont
        \newline\newline
}

% define \subsection
\newcounter{SubCount}[SectionCount]
\newcommand{\subsection}[1]{
        \ifthenelse{\value{SubCount}=0}{}{\newline\newline}
        \large
        \stepcounter{SubCount}
        \bfseries\arabic{SectionCount}.\arabic{SubCount}\hspace{3mm} #1
        \normalfont
}


\endinput
```

A.2 The mockDoc Class Binding

```
package LaTeXML::Package::Pool;
use strict;
use LaTeXML::Package;
use warnings;

#Document Structure
RegisterNamespace('mock'=>"https://kwarc.info/projects/mockDoc");
RelaxNGSchema("mockDoc.rng",'mock'=>"https://kwarc.info/projects/mockDoc");

#----------------------------------------------------------------------
DefEnvironment('{document}', "<mock:document>#body</mock:document>", beforeDigest
    => sub { AssignValue(inPreamble => 0); });
DefConstructor('\section{}', "<mock:section><mock:title>#1</mock:title>");
DefConstructor('\subsection{}', "<mock:subsection><mock:title>#1</mock:title>");
```

```
DefConstructor('\paragraph{}', "<mock:paragraph><mock:title>#1</mock:title><mock:p>
    ");
DefConstructor('\newline', "<mock:break/>");

#autoClose
Tag('mock:paragraph', autoClose=>1);
Tag('mock:section', autoClose=>1);
Tag('mock:subsection', autoClose=>1);
Tag('mock:p', autoClose=>1);
Tag('mock:p', autoOpen=>1);

#make sure Perl work
1;
```

A.3   mockDoc RelaxNG schema

```
default namespace md = "https://kwarc.info/projects/mockDoc"

start = document
document = element document {p, section*}
section = element section {title,(p |subsection)*}
subsection = element subsection {title,paragraph*}
paragraph = element paragraph { title, p }
title = element title { text }
p = element p { (text|element break { empty })*}
```

A.4   Generated XML

```
<?xml version="1.0" encoding="UTF-8"?>
<?latexml searchpaths="/Users/yuancalvin/xmlTrans/howTo"?>
<?latexml class="mockDoc"?>
<?latexml RelaxNGSchema="mockDoc.rng"?>
<mock:document xmlns:mock="https://kwarc.info/projects/mockDoc">
  <mock:section>
    <mock:title>A brief introduction about Shelley</mock:title>
    <mock:p>Percy Bysshe Shelley (4 August 1792    8 July 1822) was one of the
        major English Romantic poets, and is regarded by some critics as amongst
        the finest lyric poets in the English language.
</mock:p>
  </mock:section>
  <mock:section>
    <mock:title>Ode to the West Wind (partial)</mock:title>
    <mock:subsection>
      <mock:title>I</mock:title>
      <mock:paragraph>
        <mock:title>1.</mock:title>
        <mock:p>
O wild West Wind, thou breath of Autumn s being, <mock:break/>Thou, from whose
    unseen presence the leaves dead <mock:break/>Are driven, like ghosts from an
    enchante fleeing,
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>2.</mock:title>
        <mock:p>
Yellow, and black, and pale, and hectic red,<mock:break/>Pestilence-stricken
    multitudes: O thou, <mock:break/>Who chariotest to their dark wintry bed
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>3.</mock:title>
        <mock:p>
The winged seeds, where they lie cold and low,<mock:break/>Each like a corpse
    within its grave, until <mock:break/>Thine azure sister of the Spring shall
    blow
</mock:p>
      </mock:paragraph>
```

```
      <mock:paragraph>
        <mock:title>4.</mock:title>
        <mock:p>
Her clarion o  e r the dreaming earth, and fill <mock:break/>(Driving sweet buds
    like flocks to feed in air) <mock:break/>With living hues and odours plain and
    hill:
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>5.</mock:title>
        <mock:p>
Wild Spirit, which art moving everywhere; <mock:break/>Destroyer and Preserver;
    hear, O hear!
</mock:p>
      </mock:paragraph>
    </mock:subsection>
    <mock:subsection>
      <mock:title>II</mock:title>
      <mock:paragraph>
        <mock:title>1.</mock:title>
        <mock:p>
<!-- %**** mockDoc.tex Line 25 **** -->Thou on whose stream,   m i d the steep
    s k y  s commotion, <mock:break/>Loose clouds like E a r t h  s decaying leaves are
     shed, <mock:break/>Shook from the tangled boughs of Heaven and Ocean,
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>2.</mock:title>
        <mock:p>
Angels of rain and lightning: there are spread <mock:break/>On the blue surface of
    thine airy surge, <mock:break/>Like the bright hair uplifted from the head
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>3.</mock:title>
        <mock:p>
Of some fierce Maenad, even from the dim verge <mock:break/>Of the horizon to the
    z e n i t h  s height, <mock:break/>The locks of the approaching storm. Thou dirge
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>4.</mock:title>
        <mock:p>
Of the dying year, to which this closing night <mock:break/>Will be the dome of a
    vast sepulchre <mock:break/>Vaulted with all thy congregated might
</mock:p>
      </mock:paragraph>
      <mock:paragraph>
        <mock:title>5.</mock:title>
        <mock:p>
Of vapours, from whose solid atmosphere <mock:break/>Black rain, and fire, and hail
     will burst: O hear!
</mock:p>
      </mock:paragraph>
    </mock:subsection>
  </mock:section>
</mock:document>
```

A.5   XSL stylesheet

```
<?xml version="1.0" encoding="utf-8"?>
<!-- customized for mockDoc conversion -->

<!-- style sheet declration -->
<xsl:stylesheet version="1.0"
xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
xmlns:mock = "https://kwarc.info/projects/mockDoc"
```

```
      exclude-result-prefixes="mock">

<!-- associate the template with the root of xml -->
<xsl:template match="/">
  <html>
    <head>
      <xsl:comment>automatically generated, handle with care</xsl:comment>
    </head>
    <xsl:apply-templates/>
  </html>
</xsl:template>

<xsl:template match="mock:document">
  <body>
    <xsl:apply-templates/>
  </body>
</xsl:template>

<xsl:template match="mock:section">
  <h1>
    <xsl:value-of select="mock:title" />
  </h1>
  <p>
    <xsl:value-of select="mock:p" />
  </p>
  <xsl:for-each select="mock:subsection">
    <h2>
      <xsl:value-of select="mock:title" />
    </h2>
    <xsl:for-each select="mock:paragraph">
      <h3>
        <xsl:value-of select="mock:title" />
      </h3>
      <p>
        <xsl:value-of select="mock:p" />
      </p>
    </xsl:for-each>
  </xsl:for-each>
</xsl:stylesheet>


</xsl:stylesheet>
```

A.6   Generated HTML

```
<html><body>
<head><title>MockDoc HTML SAMPLE Output</title></head>
<section><span style="font-size:200%">
        Title:
        A brief introduction about Shelley<br></span><p>Percy Bysshe Shelley (4
            August 1792 &ndash; 8 July 1822) was one of the major English Romantic
            poets, and is regarded by some critics as amongst the finest lyric
            poets in the English language.
</p></section><section><span style="font-size:200%">
        Title:
        Ode to the West Wind (partial)<br></span><subsection><span style="font-size
            :150%">
        Title:
        I<br></span><paragraph><span style="font-size:120%">
        Title:
        1.<br></span><p>
O wild West Wind, thou breath of Autumn&rsquo;s being, Thou, from whose unseen
    presence the leaves dead Are driven, like ghosts from an enchante fleeing,
</p></paragraph><paragraph><span style="font-size:120%">
        Title:
        2.<br></span><p>
```

```
Yellow , and black , and pale , and hectic red ,Pestilence-stricken multitudes : O thou ,
    Who chariotest to their dark wintry bed
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        3.<br></span><p>
The winged seeds , where they lie cold and low ,Each like a corpse within its grave ,
    until Thine azure sister of the Spring shall blow
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        4.<br></span><p>
Her clarion o&rsquo;er the dreaming earth , and fill (Driving sweet buds like flocks
    to feed in air) With living hues and odours plain and hill:
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        5.<br></span><p>
Wild Spirit , which art moving everywhere ; Destroyer and Preserver ; hear , O hear!
</p></paragraph></subsection><subsection><span style ="font-size:150%">
        Title :
        II<br></span><paragraph><span style ="font-size:120%">
        Title :
        1.<br></span><p>Thou on whose stream , &rsquo;mid the steep sky&rsquo;s
            commotion , Loose clouds like Earth&rsquo;s decaying leaves are shed ,
            Shook from the tangled boughs of Heaven and Ocean ,
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        2.<br></span><p>
Angels of rain and lightning : there are spread On the blue surface of thine airy
    surge , Like the bright hair uplifted from the head
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        3.<br></span><p>
Of some fierce Maenad , even from the dim verge Of the horizon to the zenith&rsquo;s
    height , The locks of the approaching storm. Thou dirge
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        4.<br></span><p>
Of the dying year , to which this closing night Will be the dome of a vast sepulchre
    Vaulted with all thy congregated might
</p></paragraph><paragraph><span style ="font-size:120%">
        Title :
        5.<br></span><p>
Of vapours , from whose solid atmosphere Black rain , and fire , and hail will burst:
    O hear!
</p></paragraph></subsection></section>
</body></html>
```

B   A Makefile for Automation

```
#makefile for using latexml and pdflatex to generate *.pdf and *.xml
#declaration of variables
#set .tex as source. In our case only mockDoc is available
#name .xml and .pdf based on .tex
SRC = $(shell ls *.tex)
XML = $(SRC:%.tex=%.xml)
PDF = $(SRC:%.tex=%.pdf)


all: $(XML) $(PDF)


mockDoc.rng: mockDoc.rnc
        java -jar trang.jar -I rnc -O rng mockDoc.rnc mockDoc.rng


#the codes below follow the usage of variables mentioned above
#   $ @   : object filename.   $ <   :source file name
$(XML): %.xml: %.tex mockDoc.rng mockDoc.cls.ltxml
        latexmlc $<  --format=XML --destination=$@ --log=$@.log


$(PDF): %.pdf: %.tex mockDoc.cls
```

```
xelatex $<
```