```
<?xml version="1.0"?>
<!-- Data provided by a third-party vendor in a messy format -->
<PERIODIC_TABLE>

  <ATOM>
    <NAME>Actinium</NAME>
    <ATOMIC_WEIGHT>227</ATOMIC_WEIGHT>
    <ATOMIC_NUMBER>89</ATOMIC_NUMBER>
    <OXIDATION_STATES>3</OXIDATION_STATES>
    <BOILING_POINT UNITS="Kelvin">3470</BOILING_POINT>
    <SYMBOL>Ac</SYMBOL>
    <DENSITY UNITS="grams/cubic centimeter">
      10.07
    </DENSITY>
    <ELECTRON_CONFIGURATION>[Rn] 6d1 7s2 </ELECTRON_CONFIGURATION>
    <ELECTRONEGATIVITY>1.1</ELECTRONEGATIVITY>
    <ATOMIC_RADIUS UNITS="Angstroms">1.88</ATOMIC_RADIUS>
    <ATOMIC_VOLUME UNITS="cubic centimeters/mole">
      22.5
    </ATOMIC_VOLUME>
    <SPECIFIC_HEAT_CAPACITY UNITS="Joules/gram/degree Kelvin">
      0.12
    </SPECIFIC_HEAT_CAPACITY>
    <IONIZATION_POTENTIAL>5.17</IONIZATION_POTENTIAL>
    <THERMAL_CONDUCTIVITY UNITS="Watts/meter/degree Kelvin">
      12
    </THERMAL_CONDUCTIVITY>
  </ATOM>

  <ATOM>
    <NAME>Aluminum</NAME>
    <ATOMIC_WEIGHT>26.98154</ATOMIC_WEIGHT>
    <ATOMIC_NUMBER>13</ATOMIC_NUMBER>
    <OXIDATION_STATES>3</OXIDATION_STATES>
    <BOILING_POINT UNITS="Kelvin">2740</BOILING_POINT>
    <MELTING_POINT UNITS="Kelvin">933.5</MELTING_POINT>
    <SYMBOL>Al</SYMBOL>
    <DENSITY UNITS="grams/cubic centimeter">
      2.7
    </DENSITY>
    <ELECTRON_CONFIGURATION>[Ne] 3s2 p1 </ELECTRON_CONFIGURATION>
    <COVALENT_RADIUS UNITS="Angstroms">1.18</COVALENT_RADIUS>
    <ELECTRONEGATIVITY>1.61</ELECTRONEGATIVITY>
    <ATOMIC_RADIUS UNITS="Angstroms">1.43</ATOMIC_RADIUS>
    <HEAT_OF_VAPORIZATION UNITS="kilojoules/mole">
      290.8
    </HEAT_OF_VAPORIZATION>
    <ATOMIC_VOLUME UNITS="cubic centimeters/mole">
      10
    </ATOMIC_VOLUME>
    <HEAT_OF_FUSION UNITS="kilojoules/mole">
      10.7
    </HEAT_OF_FUSION>
    <IONIZATION_POTENTIAL>5.986</IONIZATION_POTENTIAL>
    <SPECIFIC_HEAT_CAPACITY UNITS="Joules/gram/degree Kelvin">
      0.9
    </SPECIFIC_HEAT_CAPACITY>
    <THERMAL_CONDUCTIVITY UNITS="Watts/meter/degree Kelvin">
      237
    </THERMAL_CONDUCTIVITY>
  </ATOM>

  <!-- ... Rest omitted ... -->
</PERIODIC_TABLE>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
    xmlns:p="urn:physics:elements"
    targetNamespace="urn:physics:elements"
    elementFormDefault="qualified"
    attributeFormDefault="unqualified">

    <xs:annotation><xs:documentation>
        This schema contains types which could be used to construct
        a minimal, but strict, periodic table of the elements.
    </xs:documentation></xs:annotation>

    <xs:complexType name="Element">
        <xs:annotation><xs:documentation>
            A minimal representation of a periodic element, including its
            state at room temperature or ('natural state'), assumed as
            a temperature of 300 Kelvin.
        </xs:documentation></xs:annotation>
        <xs:sequence>
            <xs:element name="name" type="xs:string"/>
            <xs:element name="symbol" type="p:AtomicSymbol"/>
            <xs:element name="atomicNumber" type="xs:positiveInteger"/>
            <xs:element name="atomicWeight" type="xs:decimal" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="naturalState" type="p:MaterialState" use="optional"/>
    </xs:complexType>

    <xs:complexType name="CollectionOfElements">
        <xs:annotation><xs:documentation>
            A sequence of elements that could represent a periodic table
        </xs:documentation></xs:annotation>
        <xs:sequence>
            <xs:element name="element" type="p:Element" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>

    <xs:simpleType name="MaterialState">
        <xs:annotation><xs:documentation>
            The state of an element: 'gas', 'liquid' or 'solid'.
        </xs:documentation></xs:annotation>
        <xs:restriction base="xs:string">
            <xs:enumeration value="gas"/>
            <xs:enumeration value="liquid"/>
            <xs:enumeration value="solid"/>
        </xs:restriction>
    </xs:simpleType>

    <xs:simpleType name="AtomicSymbol">
        <xs:annotation><xs:documentation>
            The symbol of an element, e.g. 'Al' or 'H'.
        </xs:documentation></xs:annotation>
        <xs:restriction base="xs:string">
            <xs:pattern value="[A-Z][a-z]{0,2}"/>
        </xs:restriction>
    </xs:simpleType>

    <xs:element name="periodicTable" type="p:CollectionOfElements">
        <xs:annotation><xs:documentation>
            A periodic table of elements
        </xs:documentation></xs:annotation>
    </xs:element>
</xs:schema>
```

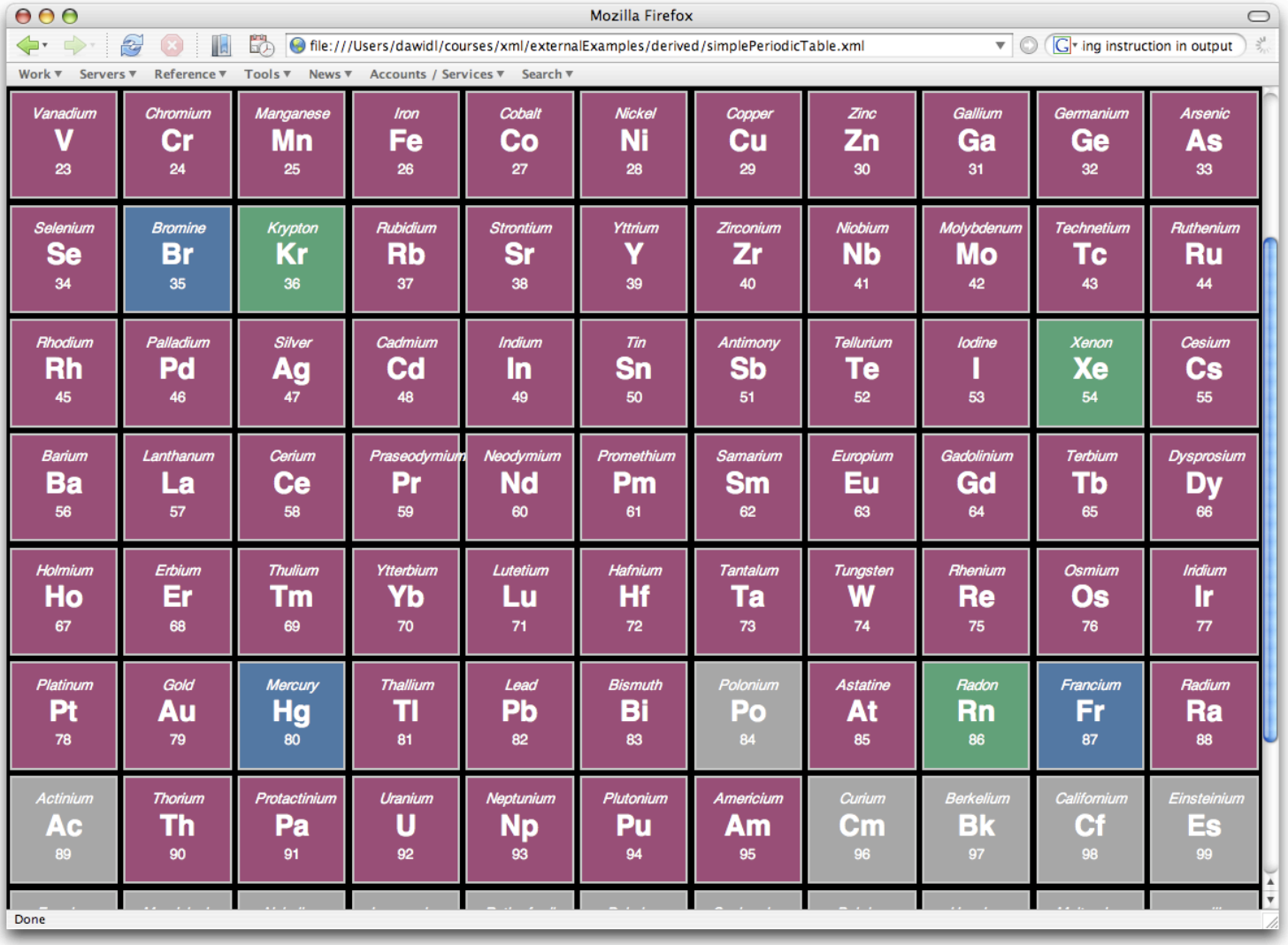
```
<?xml version="1.0" encoding="UTF-8"?>
<!-- An XSLT Transformation that transforms the complete periodic table,
    as received from a vendor in a messy format, into a minimal
    table which conforms to our XML schema. Performs the following
    key tasks:

    - Infers the state of the elements (gas, liquid, solid).
    - Translates to a namespaced vocabulary, and inserts a link to the schema
    - Inserts a link to a CSS stylesheet for visual rendering in a browser
    - Orders by atomic number
-->
<xsl:stylesheet
    xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:p="urn:physics:elements"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    version="1.0">

    <!-- Room temperature, in Kelvin (used to determine element state) -->
    <xsl:variable name="roomTemp">300</xsl:variable>

    <!-- The URI of the schema to which our output document conforms.
    In practical use, this should be a publically accessible, HTTP URL-->
    <xsl:variable name="schemaURI">periodicMinimal.xsd</xsl:variable>

    <!-- The URI of the CSS style sheet to attach to the resulting document -->
    <xsl:variable name="cssURI">periodicMinimal.css</xsl:variable>


    <!-- From the old document root, create a new (simplified) one which has links
    to the schema, etc -->
    <xsl:template match="PERIODIC_TABLE">

        <!-- Indicate that we want this processing instruction in the output document, which
        contains a link to a CSS style sheet. This enables the resulting document to be
        opened in any web browser for a pleasing view, whilst still containing all the
        information which applications / technical users might require. -->
        <xsl:processing-instruction name="xml-stylesheet">type="text/css" href="<xsl:value-of
select="$cssURI"/>"</xsl:processing-instruction>

        <!-- Insert a comment in the output -->
        <xsl:comment>This simplification automatically produced with XSLT</xsl:comment>

        <!-- The root of our new (output) document. Note the inclusion of the 'schemaLocation'
            attribute, which means our output document is instantly validatable. -->
        <p:periodicTable xsi:schemaLocation="urn:physics:elements {$schemaURI}">
            <xsl:apply-templates>
                <!-- Sort by atomic number -->
                <xsl:sort select="ATOMIC_NUMBER" data-type="number" order="ascending"/>
            </xsl:apply-templates>
        </p:periodicTable>
    </xsl:template>


    <!-- Transform each atom to it's new (simplified) form -->
    <xsl:template match="ATOM">
        <p:element>
            <!-- If we have sufficient information, determine the element's
            natural state -->
            <xsl:if test="BOILING_POINT and MELTING_POINT">
                <xsl:attribute name="naturalState">
                    <xsl:call-template name="determineState">
                        <xsl:with-param name="atom" select="."/>
                    </xsl:call-template>
                </xsl:attribute>
            </xsl:if>
            <!-- Other fields (name, symbol, etc) simply copied through -->
            <p:name><xsl:value-of select="NAME"/></p:name>
```

```
            <p:symbol><xsl:value-of select="SYMBOL"/></p:symbol>
            <p:atomicNumber><xsl:value-of select="ATOMIC_NUMBER"/></p:atomicNumber>
            <!-- Optional (if we have it) atomic weight -->
            <xsl:if test="ATOMIC_WEIGHT">
                <p:atomicWeight><xsl:value-of select="ATOMIC_WEIGHT"/></p:atomicWeight>
            </xsl:if>
        </p:element>
    </xsl:template>


    <!-- A template to determine the state of an element (liquid/gas/solid)
    based on an assumed room temperature. -->
    <xsl:template name="determineState">
        <xsl:param name="atom"/>
        <xsl:choose>
            <xsl:when test="$atom/BOILING_POINT &lt;= $roomTemp">gas</xsl:when>
            <xsl:when test="$atom/MELTING_POINT &lt;= $roomTemp and $atom/BOILING_POINT &gt;=
$roomTemp">liquid</xsl:when>
            <xsl:when test="$atom/MELTING_POINT &gt;= $roomTemp and $atom/BOILING_POINT &gt;=
$roomTemp">solid</xsl:when>
        </xsl:choose>
    </xsl:template>

</xsl:stylesheet>
```

```
<?xml version="1.0"?>
<?xml-stylesheet type="text/css" href="periodicMinimal.css"?>
<!--This simplification automatically produced with XSLT-->
<p:periodicTable xmlns:p="urn:physics:elements"
    xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
    xsi:schemaLocation="urn:physics:elements periodicMinimal.xsd">
    <p:element naturalState="gas">
        <p:name>Hydrogen</p:name>
        <p:symbol>H</p:symbol>
        <p:atomicNumber>1</p:atomicNumber>
        <p:atomicWeight>1.00794</p:atomicWeight>
    </p:element>
    <p:element naturalState="gas">
        <p:name>Helium</p:name>
        <p:symbol>He</p:symbol>
        <p:atomicNumber>2</p:atomicNumber>
        <p:atomicWeight>4.0026</p:atomicWeight>
    </p:element>
    <p:element naturalState="solid">
        <p:name>Lithium</p:name>
        <p:symbol>Li</p:symbol>
        <p:atomicNumber>3</p:atomicNumber>
        <p:atomicWeight>6.941</p:atomicWeight>
    </p:element>
    <p:element naturalState="solid">
        <p:name>Beryllium</p:name>
        <p:symbol>Be</p:symbol>
        <p:atomicNumber>4</p:atomicNumber>
        <p:atomicWeight>9.01218</p:atomicWeight>
    </p:element>

  <!-- ... SEVERAL REMOVED ... -->

    <p:element>
        <p:name>ununnilium</p:name>
        <p:symbol>Uun</p:symbol>
        <p:atomicNumber>110</p:atomicNumber>
        <p:atomicWeight>269</p:atomicWeight>
    </p:element>
    <p:element>
        <p:name>unununium</p:name>
        <p:symbol>Uuu</p:symbol>
        <p:atomicNumber>111</p:atomicNumber>
        <p:atomicWeight>272</p:atomicWeight>
    </p:element>
    <p:element>
        <p:name>ununbium</p:name>
        <p:symbol>Uub</p:symbol>
        <p:atomicNumber>112</p:atomicNumber>
        <p:atomicWeight>277</p:atomicWeight>
    </p:element>
</p:periodicTable>
```

```
/* This CSS styles a periodic table in the "urn:physics:elements" namespace for
simple interactive display in a browser. Elements are rendered as coloured blocks
(based on them being liquid/solid/gas).
*/


/* Periodic table as a whole */
periodicTable
{
    display: block;
    color: white;
    background-color: black;
    font-family: sans-serif;
    font-size: 10pt;
}

/* Individual atoms (display as small floating blocks,
by default as grey - state unknown) */
element
{
    display: block;
    width: 5em;
    height: 5em;
    margin: 0.2em;
    padding: 1em;
    border: 2px solid #BBB;
    background-color: #999;
    float: left;
    text-align: center;
}

/* Color according to states */
element[naturalState=gas]
{
    background-color: #339966;
}
element[naturalState=liquid]
{
    background-color: #336699;
}
element[naturalState=solid]
{
    background-color: #993366;
}

/* If the user's mouse moves over, change border */
element:hover
{
    border-color: white;
}

/* Contents of the box */
element name
{
    display: block;
    font-style: italic;
}

element symbol
{
    display: block;
    font-size: 2em;
    font-weight: bold;
    margin: 0.2em;
}

element atomicNumber
```

```
{
    display: block;
}

/* Do not show atomic weight by default */
element atomicWeight
{
    display: none;
    font-family: monospace;
    color: #CCC;
}

/* ...only when user's mouse hovers over */
element:hover atomicWeight
{
    display: block;
}
```


Mozilla Firefox
file:///Users/dawidl/courses/xml/externalExamples/derived/simplePeriodicTable.xml
ing instruction in output
Work
Servers
Reference
Tools
News
Accounts / Services
Search
Vanadium V 23
Chromium Cr 24
Manganese Mn 25
Iron Fe 26
Cobalt Co 27
Nickel Ni 28
Copper Cu 29
Zinc Zn 30
Gallium Ga 31
Germanium Ge 32
Arsenic As 33
Selenium Se 34
Bromine Br 35
Krypton Kr 36
Rubidium Rb 37
Strontium Sr 38
Yttrium Y 39
Zirconium Zr 40
Niobium Nb 41
Molybdenum Mo 42
Technetium Tc 43
Ruthenium Ru 44
Rhodium Rh 45
Palladium Pd 46
Silver Ag 47
Cadmium Cd 48
Indium In 49
Tin Sn 50
Antimony Sb 51
Tellurium Te 52
Iodine I 53
Xenon Xe 54
Cesium Cs 55
Barium Ba 56
Lanthanum La 57
Cerium Ce 58
Praseodymium Pr 59
Neodymium Nd 60
Promethium Pm 61
Samarium Sm 62
Europium Eu 63
Gadolinium Gd 64
Terbium Tb 65
Dysprosium Dy 66
Holmium Ho 67
Erbium Er 68
Thulium Tm 69
Ytterbium Yb 70
Lutetium Lu 71
Hafnium Hf 72
Tantalum Ta 73
Tungsten W 74
Rhenium Re 75
Osmium Os 76
Iridium Ir 77
Platinum Pt 78
Gold Au 79
Mercury Hg 80
Thallium Tl 81
Lead Pb 82
Bismuth Bi 83
Polonium Po 84
Astatine At 85
Radon Rn 86
Francium Fr 87
Radium Ra 88
Actinium Ac 89
Thorium Th 90
Protactinium Pa 91
Uranium U 92
Neptunium Np 93
Plutonium Pu 94
Americium Am 95
Curium Cm 96
Berkelium Bk 97
Californium Cf 98
Einsteinium Es 99
Done