Announcement

- Pair projects due Thursday … I do not anticipate giving any extensions for this assignment

XML is essential for huge corporate systems …. and for us

Using the Power of XML Personally

Lawrence Snyder
University of Washington, Seattle

Review ...

- Recall that XML is the land of tags that let us record our data and say what its properties are: <weight units="lbs">6</weight>
- Three types of tags
  - Identity
  - Affinity
  - Collection

```
<travels>
 <visit>
  <sight>Washington State</sight>
  <action flag="wash.gif">
   The State of Washington is a fun place to visit.
   Seattle's Space Needle and Mt. Rainier, which w
  </action>
 </visit>

 <visit>
  <sight>Oregon</sight>
  <action flag="oregon.jpg">
   South of Washington is Oregon. It is at the end
   First, the University of Oregon's team is called
   with so many women around, why is it still a ba
  </action>
 </visit>
   ...
```
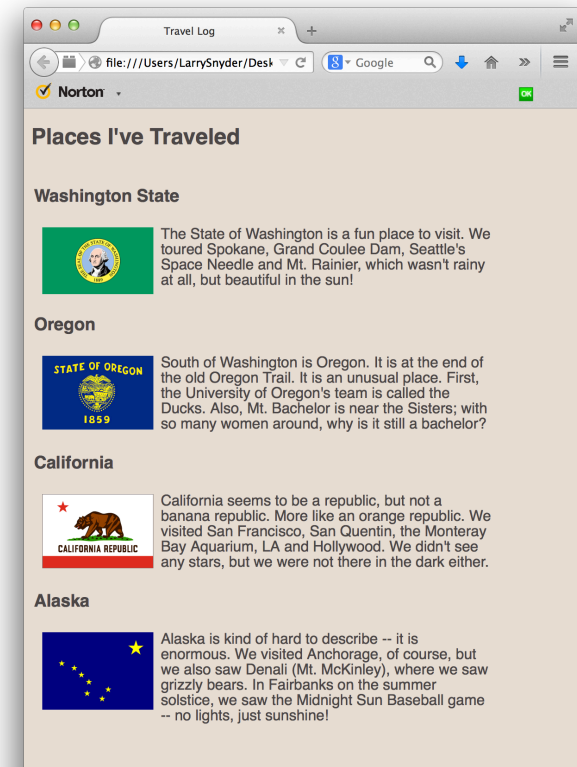
- We'll explain how you can create personal XML software for a simple task of interest to you … we'll use a travelogue as an example

```
travelLog.xml

File Path ▾ : ~/Desktop/travelLog.xml

travelLog.xml   (no symbol selected)

1   <?xml version = "1.0" encoding="UTF-8" ?>
2   <?xml-stylesheet type="text/xsl" href="travelLogSS.xsl"?>
3
4   <travels>
5     <visit>
6       <sight>Washington State</sight>
7       <action  flag="pix/wash.gif">
8       The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
9       Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
10      </action>
11    </visit>
12
13    <visit>
14      <sight>Oregon</sight>
15      <action flag="pix/oregon.jpg">
16      South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place.
17      First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters;
18      with so many women around, why is it still a bachelor?
19      </action>
20    </visit>
21
22    <visit>
23      <sight>California</sight>
24      <action flag="pix/california.png">
25      California seems to be a republic, but not a banana republic. More like an orange republic.
26      We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We
27      didn't see any stars, but we were not there in the dark either.</action>
28    </visit>
29
30  </travels>
31

Line 33 Col 1   XML   Unicode (UTF-8)   Unix (LF)   Last saved: 2/19/15 10:53:52 AM   1,142 / 169 / 33
```

+ ? =

Travel Log

file:///Users/LarrySnyder/Desk   Google

Norton

Places I've Traveled

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters; with so many women around, why is it still a bachelor?

California

California seems to be a republic, but not a banana republic. More like an orange republic. We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We didn't see any stars, but we were not there in the dark either.

Alaska

Alaska is kind of hard to describe -- it is enormous. We visited Anchorage, of course, but we also saw Denali (Mt. McKinley), where we saw grizzly bears. In Fairbanks on the summer solstice, we saw the Midnight Sun Baseball game -- no lights, just sunshine!

Why?

- Keeping the data as XML saves all of the important content – that's smart
  - Easy to add new content to XML file
- Looking at XML is terrible for humans …
  - We want a better display – HTML is our friend
  - We may not want to display all of the info, just parts
  - We will certainly change our mind about how we want to see the data
- So … solving XML + ? = HTML becomes powerful

Our Ex: A Record Of Our Travels

- An example is a travel record
- Kinds of info:
  - State name
  - What we did
  - A flag adds some interest
- Also need a title

Places I've Traveled

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters; with so many women around, why is it still a bachelor?

California

California seems to be a republic, but not a banana republic. More like an orange republic. We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We didn't see any stars, but we were not there in the dark either.

The XML File Has This Content

- Tagging the information by what it is

```xml
<travels>
  <visit>
    <sight>Washington State</sight>
    <action flag="wash.gif">
    The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
    Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
    </action>
  </visit>

  <visit>
    <sight>Oregon</sight>
    <action flag="oregon.jpg">
    South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place.
    First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters;
    with so many women around, why is it still a bachelor?
    </action>
  </visit>

  <visit>
    <sight>California</sight>
    <action flag="california.png">
    California seems to be a republic, but not a banana republic. More like an orange republic.
    We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We
    didn't see any stars, but we were not there in the dark either.</action>
  </visit>
</travels>
```
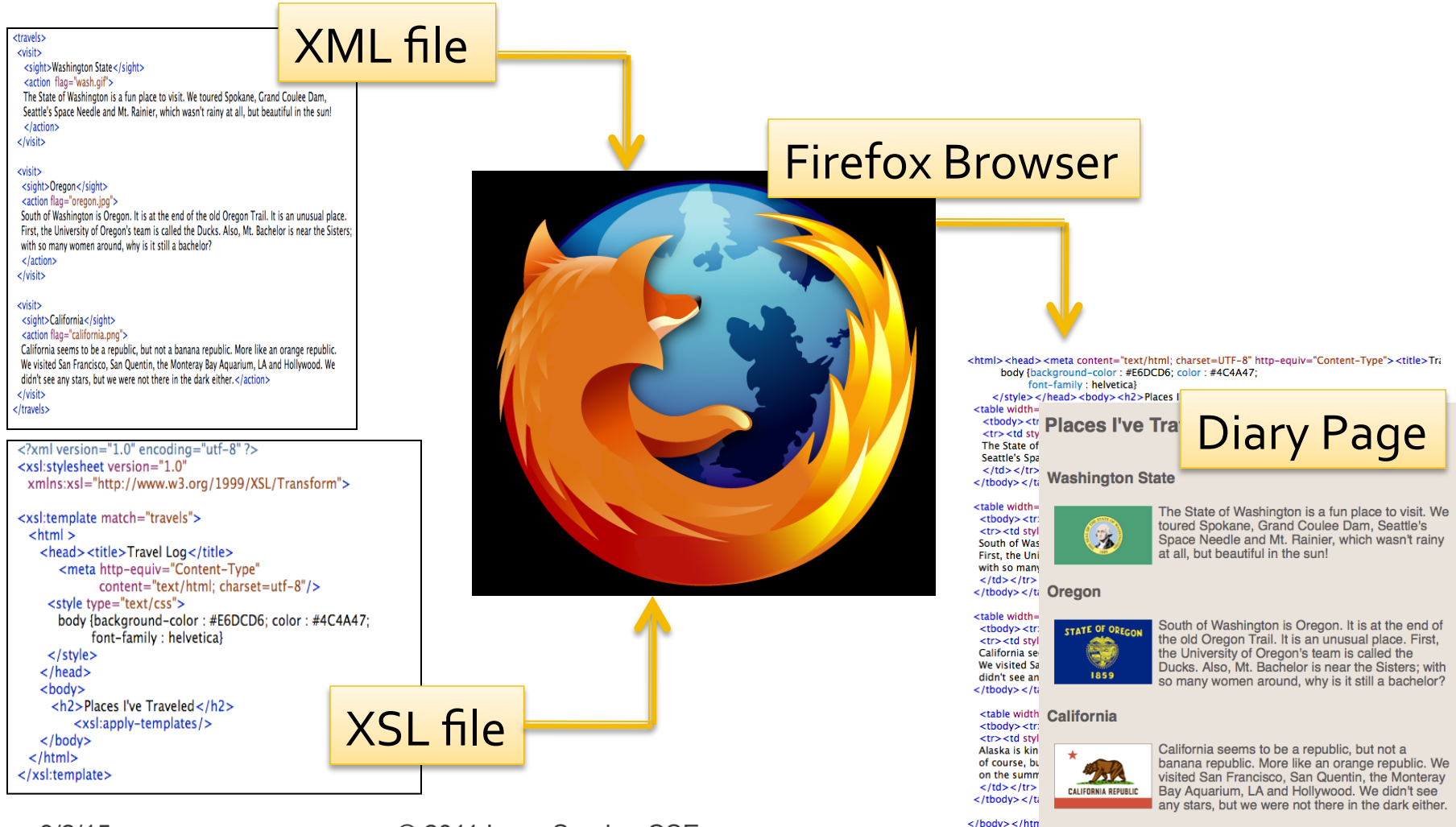
The XML File Has This Content

- Tagging the information by what it is

```xml
<travels>
 <visit>
  <sight>Washington State</sight>
  <action flag="wash.gif">
  The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
  Seattle's Spa                                                        the sun!
  </action>
 </visit>

 <visit>
  <sight>Oreg
  <action flag
  South of Was                                                        nusual place.
  First, the University of Oregon's team is called the Ducks. Also, Mt. bachelor is near the Sisters;
  with so many women around, why is it still a bachelor?
  </action>
 </visit>

 <visit>
  <sight>California</sight>
  <action flag="california.png">
  California seems to be a republic, but not a banana republic. More like an orange republic.
  We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We
  didn't see any stars, but we were not there in the dark either.</action>
 </visit>
</travels>
```

The task is to convert this XML into the Web page shown earlier

Big Picture of How This Will Work

- Here are the players in this application

XML file

Firefox Browser

Diary Page

XSL file

Firefox Combines XML+XSL → HTML

- FF combines 2 files, makes HTML, displays it

Places I've Traveled

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

```html
<html>
  <head><meta content="text/html; cl
  <title>Travel Log</title>
    <style type="text/css">
      body {background-color : #E6DC
    </style>
  </head>
  <body>
    <h2>Places I've Traveled</h2>

<table width="500">
  <tbody><tr><td><h3>Washington State</h3></td></tr>
  <tr><td style="text-size:xsmall; padding-left:10px">
  <img style="float:left; padding-right:8px" alt="Flag of Location"
      src="TravelLog1_files/wash.gif" width="120">
The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
  </td></tr>
</tbody></table>

<table width="500">
```

Firefox Combines XML+XSL → HTML

```html
<html>
  <head><meta content="text/html; charset=UTF-8" http-equiv="Content-Type">
  <visit>
    <sight>Washington State</sight>
    <action  flag="wash.gif">
    The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
    Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
    </action>
  </visit>
```

XML Input

```html
<table width="500">
  <tbody><tr><td><h3>Washington State</h3></td></tr>
  <tr><td style="text-size:xsmall; padding-left:10px">
  <img style="float:left; padding-right:8px" alt="Flag of Location"
       src="TravelLog1_files/wash.gif" width="120">
  The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
  Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
  </td></tr>
</tbody></table>

<table width="500">
```

Final HTML

Firefox Combines XML+XSL → HTML

- For each XML tag, we write an XSL template

```
<visit>
  <sight>Washington State</sight>
  <action flag="wash.gif">
  The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
  Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
  </action>
</visit>
```

XML Input

```
<xsl:template match="action">
  <tr><td style="text-size:xsmall; padding-left:10px">
     <img src="{@flag}"  alt="Flag of Location" width="120"
           style="float:left; padding-right:8px"/>
  <xsl:apply-templates/>
  </td></tr>
</xsl:template>
```

XSL Input

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Processing The Files

- For this application, "processing" the files means creating HTML from XML guided by XSL
  - Here's how ---
    - For each XML tag, we say what HTML we want, using XSL
    - Put those definitions into a file (they're called **templates**)
    - Put directions at the top of the XML definition telling it where to find the definitions file
    - "Run" the XML in Firefox (you use Firefox, right?) … it does all the rest!

XSL: Exten'ble StyleSheet Lang

- XSL is a markup language for XML … and (of course) its written in XML
- Let's take a look

```
<?xml version="1.0" encoding="utf-8" ?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform">

<xsl:template match="travels">
  <html >
    <head><title>Travel Log</title>
        <meta http-equiv="Content-Type"
              content="text/html; charset=utf-8"/>
      <style type="text/css">
        body {background-color : #E6DCD6; color : #4C4A47
              font-family : helvetica}
      </style>
    </head>
    <body>
      <h2>Places I've Traveled</h2>
          <xsl:apply-templates/>
    </body>
  </html>
</xsl:template>
```

```
<travels>
 <visit>
   <sight>Washington State</sight>
   <action  flag="wash.gif">
   The State of Washington is a fun place to vis
   Seattle's Space Needle and Mt. Rainier, whic
   </action>
 </visit>

 <visit>
  <sight>Oregon</sight>
  <action flag="oregon.jpg">
  South of Washington is Oregon. It is at the e
  First, the University of Oregon's team is calle
  with so many women around, why is it still a
  </action>
 </visit>

 <visit>
  <sight>California</sight>
  <action flag="california.png">
  California seems to be a republic, but not a l
  We visited San Francisco, San Quentin, the M
  didn't see any stars, but we were not there ir
  </action>
 </visit>
</travels>
```

The Rest of XSL Definition

- This is the remainder of the Travel Log XSL

```
<xsl:template match="visit">
  <table width="500">
    <xsl:apply-templates/>
  </table>
</xsl:template>

<xsl:template match="sight">
  <tr><td><h3>
    <xsl:apply-templates/></h3>
  </td></tr>
</xsl:template>

<xsl:template match="action">
 <tr><td style="text-size:xsmall; padding-left:10px">
    <img src="{@flag}"  alt="Flag of Location" width="120"
         style="float:left; padding-right:8px"/>
  <xsl:apply-templates/>
 </td></tr>
</xsl:template>

</xsl:stylesheet>
```

XSL is all tags because it has its own tags like <xsl:template … > plus all of the HTML tags it will output, like <h3>. But if it's an XSL tag, it says so

XSL: Extensible StyleS Langauge

- Look closely at the XSL mixing its own tags with HTML tags

```
<?xml version="1.0" encoding="utf-8" ?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform">
```

Standard header text ... must be first in XSL file

```
<xsl:template match="travels">
  <html >
    <head><title>Travel Log</title>
      <meta http-equiv="Content-Type"
            content="text/html; charset=utf-8"/>
    <style type="text/css">
      body {background-color : #E6DCD6; color : #4C4A47;
            font-family : helvetica}
    </style>
    </head>
    <body>
      <h2>Places I've Traveled</h2>
        <xsl:apply-templates/>
    </body>
  </html>
</xsl:template>
```

Here's how to say what XML tag this definition is for

HTML in here

Important tag, to be explained next

Now, Let's Just Do It

- So, we build the skeleton of the XSL with our text editor

travelLogSS.xsl   (no symbol selected)

```
<?xml version="1.0" encoding="utf-8" ?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform">

<xsl:template match="travels">
    <xsl:apply-templates/>
</xsl:template>

<xsl:template match="visit">
    <xsl:apply-templates/>
</xsl:template>

<xsl:template match="sight">
    <xsl:apply-templates/>
</xsl:template>

<xsl:template match="action">
    <xsl:apply-templates/>
</xsl:template>

</xsl:stylesheet>
```

standard header - copy

"apply-templates" tag says "style inner stuff"

Say how to style each XML tag

All that's left is HTML

Top-level Tag: <travels>

- The "root tag" needs to style the main page

```
<xsl:template match="travels">
    <xsl:apply-templates/>
</xsl:template>
```

```
<xsl:template match="travels">
  <html >
    <head><title>Travel Log</title>
        <meta http-equiv="Content-Type"
                content="text/html; charset=utf-8"/>
      <style type="text/css">
        body {background-color : #E6DCD6; color : #4C4A47;
            font-family : helvetica}
      </style>
    </head>
    <body>
      <h2>Places I've Traveled</h2>
            <xsl:apply-templates/>
    </body>
  </html>
</xsl:template>
```

"style inner stuff"

```
<travels>
 <visit>
   <sight>Washing
   <action  flag="wa
   The State of Washi
   Seattle's Space Nee
   </action>
```

XSL: Extensible StyleS Langauge

- Look closely at the XSL mixing its own tags with HTML tags

```xml
<?xml version="1.0" encoding="utf-8" ?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform">

<xsl:template match="travels">
  <html >
    <head><title>Travel Log</title>
      <meta http-equiv="Content-Type"
            content="text/html; charset=utf-8"/>
    <style type="text/css">
      body {background-color : #E6DCD6; color : #4C4A47
            font-family : helvetica}
    </style>
    </head>
    <body>
      <h2>Places I've Traveled</h2>
        <xsl:apply-templates/>
    </body>
  </html>
</xsl:template>
```

```xml
<travels>
<visit>
  <sight>Washington State</sight>
  <action  flag="wash.gif">
   The State of Washington is a fun place to vis
   Seattle's Space Needle and Mt. Rainier, whic
  </action>
</visit>

<visit>
  <sight>Oregon</sight>
  <action flag="oregon.jpg">
  South of Washington is Oregon. It is at the e
  First, the University of Oregon's team is calle
  with so many women around, why is it still a
  </action>
</visit>

<visit>
  <sight>California</sight>
  <action flag="california.png">
  California seems to be a republic, but not a l
  We visited San Francisco, San Quentin, the M
  didn't see any stars, but we were not there ir
  </action>
</visit>
</travels>
```

Continue For Other Tags

```
<xsl:template match="visit">
    <xsl:apply-templates/>
</xsl:template>
```

```
<xsl:template match="visit">
  <table width="500">
    <xsl:apply-templates/>
  </table>
</xsl:template>
```

```
<xsl:template match="sight">
    <xsl:apply-templates/></h3>
</xsl:template>
```

```
<xsl:template match="sight">
  <tr><td><h3>
    <xsl:apply-templates/></h3>
  </td></tr>
</xsl:template>
```

Grab the Attribute Value

- When we have an attribute like

    <action flag="wash.gif">

    we grab the value using a very odd syntax

    <img src="{@flag}" …

```
<xsl:template match="action">
 <tr><td style="text-size:xsmall; padding-left:10px">
    <img src="{@flag}"  alt="Flag of Location" width="120"
         style="float:left; padding-right:8px"/>
 <xsl:apply-templates/>
 </td></tr>
</xsl:template>
```

Linking to XSL

- To make this all happen, we go to the XML and link it to the XSL file
  - Add two "boiler plate" encoding lines (just copy)
  - Make href point to the XSL file

```
<?xml version="1.0" encoding="UTF-8"?>
<?xml-stylesheet type="text/xsl" href="travelLogSS.xsl"?>

<travels>
 <visit>
   <sight>Washington State</sight>
   <action  flag="wash.gif">
   The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam,
   Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!
   </action>
 </visit>

 <visit>
   <sight>Oregon</sight>
```

© 2011 Larry Snyder, CSE

Ta Dah!

We have a page! … open XML file with Firefox

Places I've Traveled

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters; with so many women around, why is it still a bachelor?

California

California seems to be a republic, but not a banana republic. More like an orange republic. We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We didn't see any stars, but we were not there in the dark either.

Now, Add to Data As Needed

- The Travel Log page is done; we don't expect to write more XSL, except to restyle something
- Just add to XML file

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First

```
<visit>
<sight>Alaska</sight>
<action flag="ak.png">
Alaska is kind of hard to describe -- it is enormous. We visited Anchorage,
of course, but we also saw Denali (Mt. McKinley), where we saw grizzly bears. In Fairbanks
on the summer solstice, we saw the Midnight Sun Baseball game -- no lights, just sunshine!
</action>
</visit>
```

Alaska

Alaska is kind of hard to describe -- it is enormous. We visited Anchorage, of course, but we also saw Denali (Mt. McKinley), where we saw grizzly bears. In Fairbanks on the summer solstice, we saw the Midnight Sun Baseball game -- no lights, just sunshine!

Done

Adding More KINDS of Data

- What about the pictures???
- Add an XML picture tag ... like HTML, it will be self-terminating; needs styling XSL, too

- <pic name="im/mtrainier.jpg" /> goes in XML
- <xsl:template match="pic">   goes in XSL
     <img src="{@name}"
            alt="Travel pic" width="500"/>
  </xsl:template>

- Place <pic> tags inside of <action> tags

Adding More XML

- Suppose our travels take us to Chicago ... we have two options:

  - Treat Chicago like any state sight – it has a flag, for example

  - Add a new kind of visit, maybe a <tour> that is similar to <action> but is used for cities; it can have different attributes, like sports_team="Cubs"

- Additional XML means more XSL is needed at the start

Redesign The Page – Only XSL

- We always think we can improve the look of our pages … OK, just tweak (or rewrite) XSL

Places I've Traveled

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters; with so many women around, why is it still a bachelor?

California

California seems to be a republic, but not a banana republic. More like an orange republic. We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We didn't see any stars, but we were not there in the dark either.

My West Coast Tour

Washington State

The State of Washington is a fun place to visit. We toured Spokane, Grand Coulee Dam, Seattle's Space Needle and Mt. Rainier, which wasn't rainy at all, but beautiful in the sun!

Oregon

South of Washington is Oregon. It is at the end of the old Oregon Trail. It is an unusual place. First, the University of Oregon's team is called the Ducks. Also, Mt. Bachelor is near the Sisters; with so many women around, why is it still a bachelor?

California

California seems to be a republic, but not a banana republic. More like an orange republic. We visited San Francisco, San Quentin, the Monteray Bay Aquarium, LA and Hollywood. We didn't see any stars, but we were not there in the dark either.

Alaska

Alaska is kind of hard to describe -- it is enormous. We visited Anchorage, of course, but we also saw Denali (Mt. McKinley), where we saw grizzly bears. In Fairbanks on the summer solstice, we saw the Midnight Sun Baseball game -- no lights, just sunshine!