



The Ticket Booth System

- We need a way to retain information between program runs.
- In real life, we would probably use a database system for this.
 - Beyond the scope of this course.
- We will use text files.

XMI

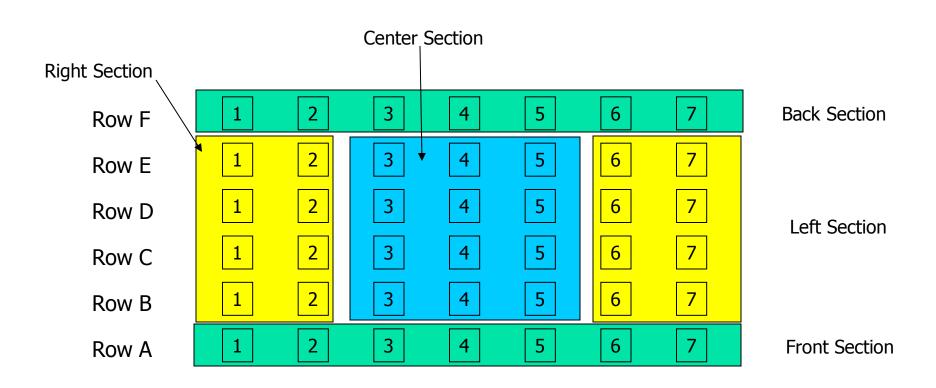
- Extensible Markup Language
- A metalanguage
 - Language used to describe languages
- Using XML we can create a markup language for a specific purpose.
 - Self describing.
 - Text based
 - System independent

XML

Like C++, XML is a big subject.

- Just a brief introduction in this course.
 - But enough to do useful work.

The Little Theater



Example: Venue.xml

- Download:
- http://www.cse.usf.edu/~turnerr/Object Oriented Design/ Downloads/2016 03 01 XML/Venue.xml
- Open in Visual Studio
 - Or you can view the file in any browser.

Venue.xml in Visual Studio

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👂 Venue.xml* - Microsoft Visual Studio
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Venue.xml*
                                                                                    ▼ X
        <?xml version="1.0" encoding="utf-8"?>
     2 - <venue_file>
            <venue>
                 <name>The Little Theater</name>
                 <address>
                     <street>145 Main Street
                     <city>Littleton</city>
                     <state>MA</state>
                     <zip_code>01420</zip_code>
    10
                 </address>
                <seat_row>...
                <seat_row>...
                <seat_row>...
   105
                <seat_row>...
   136 🛱
                <seat_row>...
   167 \pm
                 <seat_row>...
            </venue>
   198
   199 </re>
   200
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```

Things to Notice

First line

```
<?xml version="1.0" encoding="utf-8"?>
```

- Every xml file begins like this.
- The words in angle brackets are tags.
- Tags always come in matched pairs:
 - < <xxx> ... </xxx>
- Every well formed xml file has a single root tag.
 - <venue_file> in this case.
- Tags must be properly nested.

Things to Notice

- Everything between a start tag and its matching end tag is information about an object identified by the start tag.
 - Similar concept to objects in OOP.
- In Visual Studio, and other xml aware editors, we can collapse or expand the tags.

There can be multiple instances of a tag name.

```
<seat_row> ... </seat_row>
<seat_row> ... </seat_row>
<seat_row> ... </seat_row>
```

XML Tag Names

- Tag names are similar to variable names in C++.
- Tag names are case sensitive.
- Cannot contain spaces, punctuation, etc.
- Letters, digits, and the underscore character.
 - First character cannot be a digit.

Comments

- XML files can include comments
 - Same as HTML

Comments can extend over multiple lines.

Seat Row

```
🧱 Venue.xml* - Microsoft Visual Studio
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Venue.xml*
                                                                                ▼ ×
         <?xml version="1.0" encoding="utf-8"?>
      2 - <venue_file>
             <venue>
                 <name>The Little Theater</name>
                 <address>
                      <street>145 Main Street
      7
8
9
                      <city>Littleton</city>
                      <state>MA</state>
                      <zip_code>01420</zip_code>
     10
                 </address>
     11
     12 占
                 <seat_row>
     13
                      <name>A</name>
     14 占
                      <seat>
     15
                          <number>1</number>
     16
                          <section>Front</section>
     17
                      </seat>
     18
     19 📥
                      <seat>
                          <number>2</number>
     20
     21
                          <section>Front</section>
     22
                      </seat>
     23
     24 📥
                      <seat>
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```

Describing a Seat Row

- A seat_row has:
 - A Name
 - An arbitrary number of Seats.
- Each seat has
 - A number
 - A section name

4

Using XML in a Program

- We can write code to output objects to an XML file.
 - Similar to a Display method.
- Save objects on disk between program runs.
 - Serialization.
- Likewise, we can create objects using information read from an XML file.
 - Deserialization
- Need an XML parser.

Other XML Files

http://www.cse.usf.edu/~turnerr/Object Oriented Design/Downloads/ 2016 03 01 XML/Venue.xml

- Ticket.xml
- Show.xml
- Booking.xml

A Ticket in XML

```
👂 Ticket.xml - Microsoft Visual Studio
File Edit View Project Debug XML Tools Test Window Help
unsigned_int
Ticket.xml Venue.xml
                                                                            ▼ X
     1 □ <ticket>
     2
3
            <venue_name>The Little Theater/venue_name>
            <show_name>The Music Man</show_name>
     5
6
7
            <performance_date>
                <year>2007
                <month>12</month>
     8
9
                <day>6</day>
            </performance_date>
    10
    11
            <performance_time>
    12
                <hour>19</hour>
    13
                <minute>30</minute>
    14
            </performance_time>
    15
    16
            <seat>
                <row_name>A</row_name>
    18
                <number>1</number>
    19
                <section>Front</section>
    20
            </seat>
    21
22
            <ticket_status>sold</ticket_status>
       </ticket>
    24
Item(s) Saved
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A Show in XML

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Show.xml
                                                                                     ▼ X
        <?xml version="1.0" encoding="utf-8" ?>
      2 □ <show>
             <name>The Music Man</name>
             <duration>135</duration>
             <setup_time>120</setup_time>
             <takedown_time>75</takedown_time>
             <price_schedule>
                 <name>Premium</name>
    10
                 <price_level_1>125</price_level_1>
    11
                 <price_level_2>95</price_level_2>
    12
                 <price_level_3>75</price_level_3>
    13
             </price_schedule>
    14
    15
             <price_schedule>
    16
                 <name>Normal</name>
    17
                 <price_level_1>95</price_level_1>
    18
                 <price_level_2>80</price_level_2>
                 <price_level_3>65</price_level_3>
    19
    20
             </price_schedule>
    21
     22
             <price_schedule>
     23
                 <name> Economy </name>
    24
                 <price_level_1>75</price_level_1>
    25
                 <price_level_2>60</price_level_2>
     26
                 <price_level_3>45</price_level_3>
    27
             </price_schedule>
    28
        </show>
    29
Ready
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A Booking in XML

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 Show.xml Bookings.xml
                                                                                          ▼ X
         <?xml version="1.0" encoding="utf-8" ?>
      2 < booking>
      3
              <show_name>The Music Man</show_name>
              <venue_name>The Little Theater</venue_name>
              <!-- There must be a price_spec for each seating section -->
              <price_spec>
                  <section>Front</section>
      9
                  <price_level>3</price_level>
     10
              </price_spec>
     11
              <price_spec>
     12
                  <section>Right</section>
     13
                  <price_level>2</price_level>
     14
              </price_spec>
     15
              <price_spec>
     16
                  <section>Center</section>
                  <price_level>1</price_level>
     17
     18
              </price_spec>
     19
              <price_spec>
     20
                  <section>Left</section>
     21
                  <price_level>2</price_level>
              </price_spec>
     23
              <price_spec>
     24
                  <section>Back</section>
     25
                  <price_level>3</price_level>
     26
              </price_spec>
     27
Item(s) Saved
                                                                    Col 1
                                                                             Ch 1
```

Booking (continued)

```
Bookings.xml* - Microsoft Visual Studio
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 Show.xml Bookings.xml*
                                                                                                                                                                                                                                                                                                                                                       ▼ X
                                                     </price_spec>
                   26
                    28
                                                     <performance>
                                                                      <date>
                   30
                                                                                       <year>2010</year>
                                                                                       <month>12</month>
                                                                                       <day>2</day>
                   33
                                                                      </date>
                                                                      <start_time>
                                                                                       <hour>19</hour>
                   36
                                                                                       <minute>30</minute>
                   37
                                                                      </start_time>
                   38
                                                                      <price_schedule>Normal</price_schedule>
                   39
                                                     </performance>
                   40
                                                     <performance>
                   41
                                                                      <date>
                                                                                       <year>2010
                                                                                       <month>12</month>
                                                                                       <day>3</day>
                   46
                                                                      </date>
                                                                      <start_time>
                                                                                       <hour>20</hour>
                   48
                   49
                                                                                       <minute>0</minute>
                   50
                                                                      </start_time>
                                                                      <price_schedule>Premium</price_schedule>
                   51
                   52
                                                     </performance>
Ready
                                                                                                                                                                                                                                         Ln 40
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Ex

Exercise

What will be the price of a ticket for seat B4 for the performance of the Music Man at the Little Theater on Dec. 2, 2010?

 Try to answer this on your own, before looking at the answer on the next slide.

Answer

\$95

Venue

Seat B4 is in the Center section.

Booking

- The Center section will have price level 1
- Dec. 2 will have the Normal price schedule.

Show

In the Normal price schedule, level 1 is \$95