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Announcements

- New deadlines because of snow
  - Today by 5pm: Labs 4 and 5
  - Tomorrow by 11pm: Project 1A
  - A week from tomorrow by 11pm: Project 1B
    - Thursday, February 7

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Announcements

- Quiz 2
  - Each quiz was different
  - Your TA will tell you if your

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Announcements

- Quiz 3
  - Thursday and Friday
  - Chapters 7 and 8 of *Fluency*
  - Review
    - Questions at end of chapters
    - Answers at back of book
    - Lectures

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Announcements

- Chapter 10 for today
- Chapter 18 for Friday

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Basic HTML and Nesting

```
<html>
   <head>
      <title>Basic HTML</title>
   </head>
   <body>
   </body>
</html>
```

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<html>
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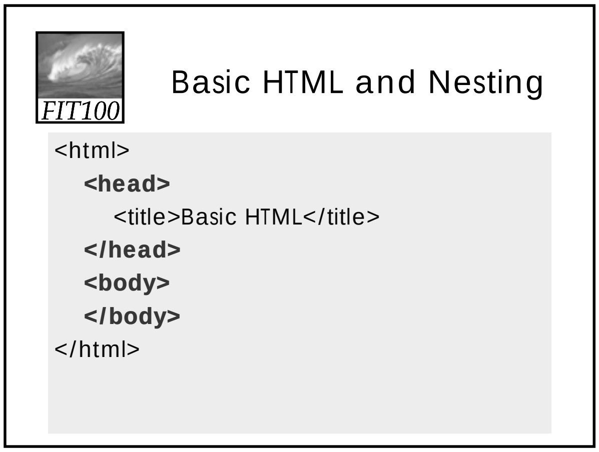

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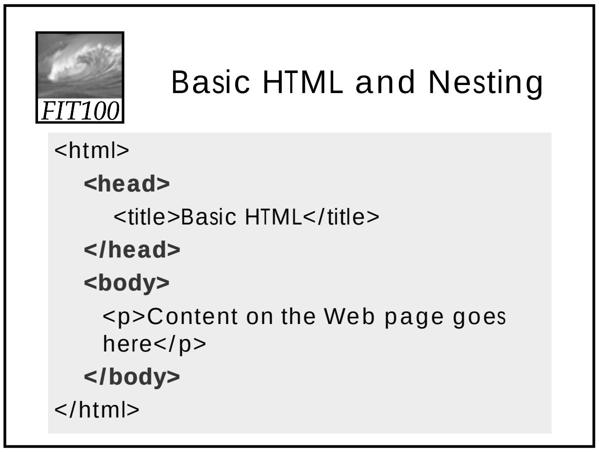

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Basic HTML and Nesting

```
<html>
   <head>
      <title>Basic HTML</title>
   </head>
   <body>
     <p>Content on the Web page goes
     here</p>
   </body>
</html>
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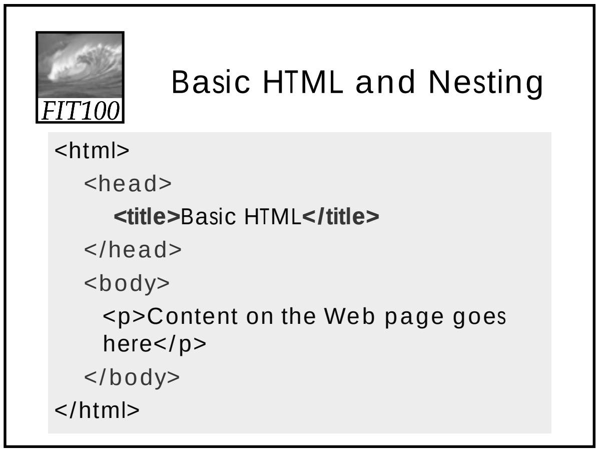

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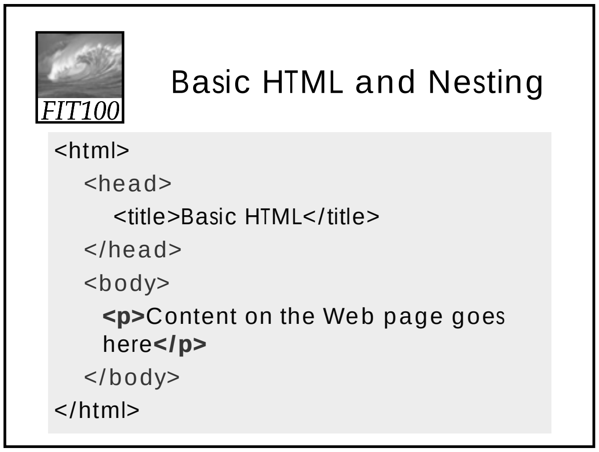

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Basic HTML and Nesting

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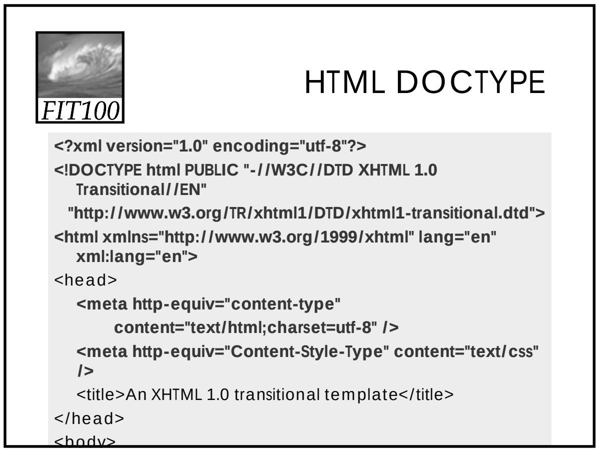

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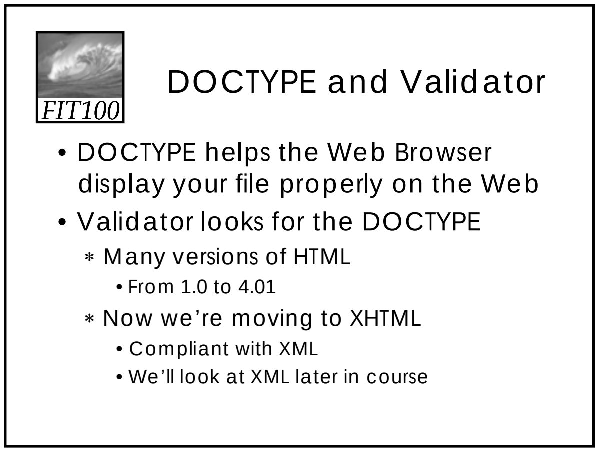
HTML DOCTYPE

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0
    Transitional//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" lang="en"
    xml:lang="en">
<head>
    <meta http-equiv="content-type"
           content="text/html;charset=utf-8" />
    <meta http-equiv="Content-Style-Type" content="text/css"
    />
    <title>An XHTML 1.0 transitional template</title>
</head>
<body>
```



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DOCTYPE and Validator

- DOCTYPE helps the Web Browser display your file properly on the Web
- Validator looks for the DOCTYPE
  - Many versions of HTML
    - From 1.0 to 4.01
  - Now we're moving to XHTML
    - Compliant with XML
    - We'll look at XML later in course

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XHTML 1.0 Rules

- Delete any blank lines or tabs or spaces at top of file.
- Change all tags to lower case.
- Put quotes around all attributes in tags
- Fix deprecated, or obsolete, tags:
  - Change <b> to <strong>
  - Change <i> to <em>
  - Change <u> to <em>

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XHTML 1.0 Rules

- Fix these three *special* tags so they *self*-close:
  - Change <br> to <br />
  - Change <hr> to <hr />
  - Change <img ... > to <img ... />

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XHTML 1.0 Rules

- Nesting issues:
  - Tags must be "nested" properly:
    - RIGHT
      <p><em>Book Title</em> by Author</p>
    - WRONG
      <em><p>Book Title</em> by Author</p>
  - Right or wrong?
    - <strong><p>Nesting means always wrap the text with one set of tags and then wrap that within the next</strong></p>

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XHTML 1.0 Rules

- Nesting issues:
  - Don’t nest a list within <p> tags
  - Always put <br /> within <p> or <div> or <a> tags
  - An <a> tag can be within a <p> tag but a <p> cannot be inside an <a> tag.

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Validating XHTML 1.0

- Fix one error, save, upload, refresh, revalidate; many errors will fall away.
- The Validator will read the DOCTYPE and know which version of HTML or XHTML you are using
  - DOCTYPE helps the Web browser display the page correctly

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What's The Plan? Algorithmic Thinking

Step-by-step directions for whatever someone, or the computer, needs to do

Algorithm

- A precise, systematic method for producing a specified result
- In real life we do this all the time:

Video

- Algorithms

Five Essential Properties of Algorithms

1. Input specified
   - ∗ Data to be transformed during the computation to produce the output
   - ∗ Must specify type, amount, and form of data
2. Output specified
   - ∗ Data resulting from the computation—intended result
   - ∗ It is possible to have no output

Five Essential Properties (cont'd)

3. Definiteness
   - ∗ Specify the sequence of events
   - ∗ Details of each step, including how to handle errors
4. Effectiveness
   - ∗ The operations are doable
5. Finiteness
   - ∗ Must eventually stop

Language in Algorithms

- *Natural language*
  - ∗ For people, we use a natural language like English
  - ∗ Ambiguity is common in natural language
- *Programming Language*
  - ∗ Formal languages designed to express algorithms
  - ∗ Precisely defined; no ambiguity

Context Matters

- Program can fulfill five properties of an algorithm, be unambiguous, and still not work right because it is executed in the wrong context
  - ∗ e.g., last name in Western countries means family name; in Asian countries it may mean given name
- Context matters: Driving instructions
  - ∗ "From the Limmat River go to Bahnhof Strasse and turn right."
  - ∗ Assumes you are traveling in a specific direction. If you are not, the directions will fail.

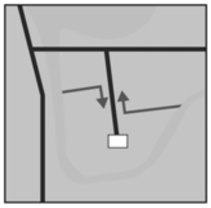

Figure 10.1. *Diagram of approaching a street (Bahnhof Strasse) from different directions, giving the "turn right" instruction different meanings.*

Program vs. Algorithm

- A program is an algorithm that has been customized to
  - ∗ solve a specific task
    - under a specific set of circumstances
      - – using a specific language
- Algorithm is a general method; program is a specific method

An Algorithm: *Alphabetize CDs*

- Imagine CDs in a slotted rack, not organized
- You want to alphabetize by name of group, performing musician, or composer
- How do you solve this problem?

Animation

- Sorting CDs

Analyzing Alphabetize CDs Algorithm

- Illustrates the five basic properties of algorithms
  - ∗ Inputs and Outputs were listed
  - ∗ Each instruction was defined precisely (definiteness)
  - ∗ Operations are effective because they are simple and mechanically doable
  - ∗ Alphabetizing is mechanical, so our algorithm is effective
  - ∗ Finiteness is satisfied because there are only a finite number of slots that can be paired, so instructions 4, 5, and 6 cannot be repeated indefinitely

A Deeper Analysis

- Structural features
  - ∗ Two instructions, 5 and 6, in which the agent is directed to go back and repeat instructions. This is called a *loop.*
  - ∗ Loops and Tests
    - A loop must include a test to determine whether the instructions should be repeated one more time
  - ∗ Assumptions
    - We assume that
      - – The CD rack is full (instructions do not handle the case of an empty slot)
      - – The word "following" means a slot further from the start point

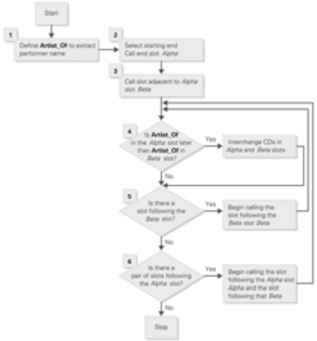
Start
1
Define **Artist_Of** to extract performer name
2
Select starting end
Call end slot *Alpha*
3
Call slot adjacent to *Alpha* slot *Beta*
4
Is **Artist_Of** in the *Alpha* slot later than **Artist_Of** in *Beta* slot?
Yes
Interchange CDs in *Alpha* and *Beta* slots
No
5
Is there a slot following the *Beta* slot?
Yes
Begin calling the slot following the *Beta* slot *Beta*
No
6
Is there a pair of slots following the *Alpha* slot?
Yes
Begin calling the slot following the *Alpha* slot *Alpha* and the slot following that *Beta*
No
Stop

Figure 10.3. *Flowchart of* Alphabetize CDs. *Operations are shown in rectangles; decisions are shown in diamonds. Arrows indicate the sequencing of the operations.*

Exchange Sort Algorithm

- The Alphabetize CDs example illustrates the standard *Exchange Sort* algorithm
  - The idea of comparing pairs of items chosen in a particular way, exchanging them if they are out of order, and continuing to sweep through the items
  - We could use the same algorithm to sort on a different principle

Announcements

- Chapter 18 for Friday