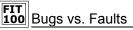


© Copyright 2000-2001, University of Wa



- When the car doesn't start because of a dead battery, figuring out the problem uses debugging skills ... however, finding the dead battery is not technically debugging – it's "fault identification".
  - □ When the error is a failing component of a correct design, it is a fault ... when the battery is fixed, the car runs
  - U When the error is a failure of the design, it is a bug
- When dealing with complex computer software and technologies, the chances are extremely high that the error is a bug

□ In other words, you've most likely made a reasoning error

© Copyright 2000-2001, University of Was

### **FIT 100** To Debug is to Think Abstractly Debugging is a process that improves with practice.

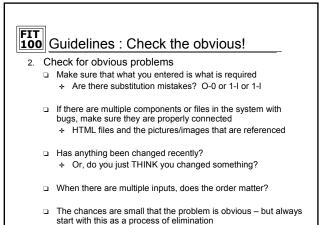
- \* Helps you trace what is going wrong with the program at hand
- An effective way to proceed is to...
  - Think about what you know ... the facts
  - Consider what should be true ... the assumptions
  - □ Formulate a test hypothesis ... gather evidence
  - □ Work intelligently ... assess if you're making progress
- \* Think about how great it feels to find the problem that stumped everyone else!

© Copyright 2000-2001, University of Washin



# **FIT 100** Guidelines for Debugging

- There is no one sure way to debug. Every situation is ٠ different...but there are some guidelines you can follow
- 1. Make sure the error is reproducible in other words, make it happen again
  - "Transient errors" can occur
  - The error may have been caused by a state or configuration that was unknowingly set .. Get a "clean" instance of the bug
  - U When reproducing the error, try to work with or create a minimal version of the system or program with the bug + Copy a chunk of HTML and look at it by itself
    - wright 2000-2001 University of Washing



© Copyright 2000-2001. University of Wa

# **FIT 100** Guidelines : Isolate the error

- 3. Isolate the problem Most likely the error is in a specific place in the system/program, so sections that are "correct" should be removed from consideration
  - Isolating the problem to a specific procedure is best
    - + Your HTML displays up to a point, then nothing you know where you should start looking
  - Verifying that parts you think are correct really ARE correct is essential
    - + Are you SURE you don't have to end a tag, or enclose a value in quotes?

© Copyright 2000-2001, University of Wash

### **FIT 100** Guidelines : Step through the process 4. Ok, you've isolated the error - now what? Reason through the process start-to-finish, predicting what

- should be computed and then verifying that is has been
- □ If your prediction doesn't match an observation, then move inwards and further isolate the problem
  - + The process was OK prior to this step
  - + The process was incorrect after this step
- Look at the inputs and reason through the step
- □ If the bug isn't found, continue applying the guidelines

© Copyright 2000-2001, University of Washingto



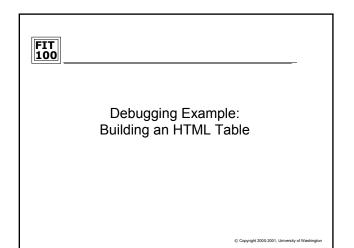
# **FIT 100** Guidelines : Assess Objectively

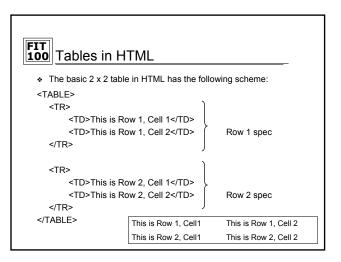
It often will happen that you check everything out 5. and find it to be OK, but the bug is still there

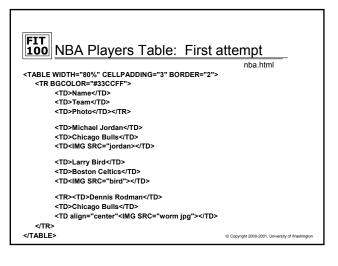
DON'T become frustrated!!!! Instead, evaluate your progress objectively

- Are you making a wrong assumption
- Are you misinterpreting the data input or output?
- Have you made a wrong prediction/deduction?

Copyright 2000-2001, University of Washingto









#### 100 Steps

- Is the bug reproducible? ...reconstruct web page
- Check the "obvious" stuff ... locate the NBA photos
- Isolate the problem ... analyze the page –what's wrong?
- Reason through the process
  - □ Think about what should be happening (what you should see)
  - Make predictions and check if they occur
- Assess your progress objectively (don't freak out!!!!)
  - What do you need to know or find out?
  - □ Are there other things you can do?
  - Don't get frustrated (I know it's easy to do!)

Copyright 2000-2001, University of Washingto