Methods, Boolean Expressions, & Control Structures

CS 99 – Summer 2000
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Lecture 3

Administration

- No class tomorrow
- Lab 2 due Wednesday (on floppy)
- Lab 3 posted this afternoon, due Thursday
- Instruct accounts

Agenda

- Finish discussing methods
- Boolean expressions
- Control structures

Method Calls

- Method Call Walkthrough
- Online at course website

Boolean Expressions

- Named for George Boole (1815-1864)
- Boolean algebra ~ Propositional logic
  - All variables have a value of either true or false
- Java has boolean available as a primitive type
- Java also has several operators that can be applied to boolean variables and values

Boolean Operators

- AND
  - a AND b is true exactly when both a and b are true
  - Truth table:
    - Java: &
    - Math: ^

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>a AND b</th>
</tr>
</thead>
<tbody>
<tr>
<td>false</td>
<td>false</td>
<td>false</td>
</tr>
<tr>
<td>false</td>
<td>true</td>
<td>false</td>
</tr>
<tr>
<td>true</td>
<td>false</td>
<td>false</td>
</tr>
<tr>
<td>true</td>
<td>true</td>
<td>true</td>
</tr>
</tbody>
</table>
### Boolean Operators [2]

- **OR**
  - a OR b is true exactly when a is true, b is true, or both are true
  - Truth table:
    | a | b | a OR b |
    |---|---|-------|
    | f | f | f     |
    | f | t | t     |
    | t | f | t     |
    | t | t | t     |
  - Java: `||`
  - Math: `∨`

### Boolean Operators [3]

- **NOT**
  - NOT a is the opposite of a
  - Truth table:
    | a | NOT a |
    |---|------|
    | f | t    |
    | t | f    |
  - Java: `!`
  - Math: `¬`

### Logical Operators

- `&&` AND
- `||` OR
- `!` NOT
- `&=, |=` AND assignment, OR assignment

Operands and resulting values are boolean

### Precedence

- `!`
- `&&`
- `||`

### Control Structures

- Two things missing:
  - Ability to make a choice to execute one piece of code or another
  - Ability to execute a piece of code an unknown number of times
- Conditional statements (selection, alternation)
- Repetition statements (loops)

### Selection Statements

- Express a choice between two different pieces of code to execute
- Example:
  ```java
  if user entered "quit"
  terminate program
  otherwise
  process input
  ```
Repetition Statements

• Allow code to be repeated until something is true or false
• Example:
  
do
    display menu
    get choice
  until choice is "quit"