

Lecture Set #11: Ternary Operator, Switch, Break, Continue

1. ternary operator: The ?:
(conditional operator)
2. switch
3. break/continue



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The Conditional Operator

- The only ternary operator (has 3 operands)
- Format:
 - `boolean-expression?expression1:expression2`
- Purpose:
 - test to see if boolean-expression is true or false
 - whole expression takes on the value of expression1 when boolean-expression was true
 - whole expression takes on the value of expression2 when boolean-expression was false
- See examples



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What is another way to write this if-else-if statement?



```
if (grade == 'A')
    System.out.println ("I'm very happy");
else if (grade == 'B')
    System.out.println ("I'm relatively happy");
else if (grade == 'C')
    System.out.println ("At least I get credit");
else
    System.out.println ("Check with the professor");
```

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The switch Statement: General Form



```
switch ( control-expression ) {
case case-label-1 :
    statement-sequence-1
    break;
case case-label-2 :
    statement-sequence-2
    break;
...
case case-label-n :
    statement-sequence-n
    break;
default :
    default-statement-sequence
    break;
}
```

The control-expression is one of the following types:
char, int, short, byte

Our text says it cannot be a byte or short.
This is wrong!

Each case label must be a value in type of control expression

You may have any number of statements, including if-else and loops

The "break" statement jumps out of the switch statement

The optional "default" case is executed if no other case matches

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The default Case

- `default` is optional
If omitted, and no case matches, then the switch statement does nothing
- However: you should **always include** a default case, even if you want nothing to be done if no case matches (you should never rely on implicit behavior!)
- Although cases are not required to be in order ... (following is legal):

```
switch ( option ) {  
  case 2:  
    ...  
  case 9:  
    ...  
  default:  
    ...  
  case 1:  
    ...  
}
```
- ... it is much better to list cases:
 - in increasing order
 - with default last

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Case Continuation

- The **control expression** can have one of the following types: `char`, `int`, `short`, `byte`
 - not `float`, `double`, `boolean`, `long`
 - not a `String` or other object
- Case continuation also called “cascading case behavior”, “falling through to the next case”, etc.
- It is occasionally handy for combining of cases
e.g. case-insensitivity

```
switch (grade) {  
  case 'a':  
  case 'A':  
    System.out.println ("I'm very happy");  
    break;  
  ...  
}
```
- **Be very careful** about using this cascading behavior!
 - Always insert `break` statements after every case
 - Then remove ones you do not want

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Why Use switch?

- `switch` can also be implemented using `if-else`
- `switch` also restricted in terms of data types in control statements
- Including `break` statements is a pain
- However
 - `switch` often more efficient (compiler generates better code)
 - Code can be more compact because of case-continuation behavior
 - Sometimes case analysis is clearer using `switch`

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More about break for loops

- `break` can also be used to **exit immediately** from any loop
 - `while`
 - `do-while`
 - `for`
- e.g. "Read numbers from input until negative number encountered"

```
Scanner sc = new Scanner (System.in);
int n;
while (true) {
    n = sc.nextInt ();
    if (n < 0)
        break;
    else
        <process n>;
}
```

 - Loop only terminates when `break` executed
 - This only happens when `n < 0`

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Warning about break

- Undisciplined use of `break` can make loops impossible to understand
 - Termination of loops without `break` can be understood purely by looking `while`, `for` parts
 - When `break` included, arbitrary termination behavior can be introduced
- Rule of thumb: use `break` only when loop condition is always true (i.e. `break` is only way to terminate loop)
- When you use it, make sure it has a good comment explaining what is happening

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continue Statement

- `continue` can also be used to affect loops
 - `break` halts loops
 - `continue` jumps to bottom of loop body
- Following prints even numbers between 0 and 10

```
for (int i = 0; i <= 10; i++){
    if (i % 2 == 1)
        continue;
    System.out.println (i);
}
```

 - Effect of `continue` statement is to jump to bottom of loop immediately when `i` is odd
 - This bypasses `println`!
- `continue` should be avoided
 - Confusing
 - Easy equivalents exist (e.g. `if-else`)
 - Included in Java mainly for historical reasons
- When you use it, make sure it has a good comment explaining what is happening

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