



Miscellaneous Java

TOPICS

- Bit Operators
- Character and String Classes
- Integer and Double Classes
- Arrays Class



Java Bitwise Operators

- Java has six bitwise operators:

Symbol	Operator
&	Bitwise AND
 	Bitwise OR
^	Bitwise XOR
~	Bitwise NOT
<<	LEFT SHIFT
>>	RIGHT SHIFT

CS 160, Spring Semester 2014

2



Java AND and OR

AND operator (&)

A	B	A & B
0	0	0
0	1	0
1	0	0
1	1	1

OR operator (|)

A	B	A B
0	0	0
0	1	1
1	0	1
1	1	1

CS 160, Spring Semester 2014

3



Java XOR and NOT

XOR operator (^)

A	B	A ^ B
0	0	0
0	1	1
1	0	1
1	1	0

NOT operator (~)

A	~A
0	1
1	0

CS 160, Spring Semester 2014

4



Binary to Decimal

Decimal	Binary	Decimal	Binary
0	0000b	8	1000b
1	0001b	9	1001b
2	0010b	10	1010b
3	0011b	11	1011b
4	0100b	12	1100b
5	0101b	13	1101b
6	0110b	14	1110b
7	0111b	15	1111b

CS 160, Spring Semester 2014

5



Binary to Decimal

- 0-9 are used for decimal numbers (base-10):
 - $149 = 1*10^2 + 4*10^1 + 9*10^0$
- 0-1 are used for binary numbers (base-2):
 - $1010b = 1*2^3 + 0*2^2 + 1*2^1 + 0*2^0 = 8 + 2 = 10$
- Example:
 - 10111b in decimal?
 - $1*2^4 + 0*2^3 + 1*2^2 + 1*2^1 + 1*2^0 = 16 + 4 + 2 + 1 = 23$
 - What is 14 in binary?
 - $8 + 4 + 2 = 1*2^3 + 1*2^2 + 1*2^1 + 0*2^0 = 1110b$

CS 160, Spring Semester 2014

6



Bitwise Operator Examples

- 4-bit numbers:
 - $6 \& 5 = 0110b \& 0101b = 0100b = 4$
 - $6 | 5 = 0110b | 0101b = 0111b = 7$
 - $6 \wedge 5 = 0110b \wedge 0101b = 0011b = 3$
 - $\sim 6 = \sim 0110b = 1001b = 9$
- 8-bit numbers:
 - $6 \ll 3 = 00000110b \ll 3 = 00110000b = 48 (6 * 8)$
 - $48 \gg 4 = 00110000b \gg 4 = 00000011b = 3 (48 / 16)$

CS 160, Spring Semester 2014

7



Masking Operations

- Clearing bits:
 - $x = 00101001b = 41$
 - want to clear top 4-bits
 - $x = x \& 00001111b = x \& 15 = 00001001b = 9$
- Setting bits:
 - $x = 00101001b = 41$
 - want to set bottom 4-bits
 - $x = x | 00001111b = x | 15 = 00101111b = 47$

CS 160, Spring Semester 2014

8



Character Class

- Methods that detect types of characters:
 - `Character.isUpperCase(char c);`
 - `Character.isLowerCase(char c);`
 - `Character.isDigit(char c);`
 - `Character.isLetter(char c);`
 - `Character.isSpace(char c);`
- Example:
 - `Character.isLetter('8') == false`
 - `Character.isLowerCase('a') == true`

CS 160, Spring Semester 2014

9



String Class

- Methods that manipulate strings:
 - `String.toUpperCase();`
 - `String.toLowerCase();`
 - `String.substring(int beginIndex, int endIndex);`
- Example using `String s = "HelloThere";`
 - `s.toUpperCase()` returns `"HELLOTHERE"`
 - `s.toLowerCase()` returns `"hellothere"`
 - `s.substring(2,7)` returns `"lloTh"`

CS 160, Spring Semester 2014

10



Integer and Double Classes

- Methods that parse strings to return numbers:
 - `Integer.parseInt(String s);`
 - `Double.parseDouble(String s);`
- Example:
 - `Integer.parseInt("154")` returns 154
 - `Double.parseDouble("12.5")` returns 12.5
 - `Integer.parseInt("Hello")` gets an exception
 - `Double.parseDouble("There")` gets an exception

CS 160, Spring Semester 2014

11



Arrays Class

- Methods to manipulate arrays:
 - `Arrays.toString(int array[]);`
 - `Arrays.sort(int array[]);`
 - `Arrays.equals(int a1[], int a2[]);`
- Example using `int array[] = {4, 3, 5, 2, 1};`
 - `Arrays.toString(array)` returns `"[4, 3, 5, 2, 1]"`
 - `Arrays.sort(array)` sorts array to `{1, 2, 3, 4, 5}`
 - `Arrays.equals(array, array) = true`

CS 160, Spring Semester 2014

12



Date Class

- Methods to manipulate dates and times:
- Example code and output:

```
String myFormat = "dd/MM/yyyy (HH:mm:ss)";
SimpleDateFormat dateFormat =
    new SimpleDateFormat(myFormat);
Date date = new Date();
System.out.println(dateFormat.format(date));
```

19/11/2013 (21:17:27)

CS 160, Spring Semester 2014

13



Enumerated Types

- General Form:

```
public enum DayOfWeek { SUNDAY, MONDAY,
    TUESDAY, WEDNESDAY, THURSDAY, FRIDAY,
    SATURDAY }
```
- Example Usage:

```
DayOfWeek day = THURSDAY;
switch (day) {
    case MONDAY:
    case TUESDAY:
        ...
```

CS 160, Spring Semester 2014

14



Ternary Operator

- General Form:

```
boolean expression ? value1 : value2
```
- Example Usage:

```
(age >= 18) ? eStatus = ADULT : eStatus = MINOR;
```
- Conditional Equivalent:

```
if (age >= 18)
    eStatus = ADULT;
else
    eStatus = MINOR;
```

CS 160, Spring Semester 2014

15