`boolean` and `if`

Logical Operators

Lecture Contents

- Logical Operators
- Operator Precedence

Operator Types

✓ *Arithmetic*			+	–	*	/	%
✓ *Assignment*	=		+=	–=	*=	/=	%=
✓ *Increment*			++	– –			
✓ *Comparison*	!=	==	>	>=	<	<=	
Logical	!		||		&&		
Bitwise	~ ~=		| |=		& &=		^ ^=

Logical operators take two `boolean` as parameters and return a `boolean`.

(Remember: a `boolean` can only be either `true` or `false`).

Logical Operators

Symbol	Name
!	Logical NOT
&&	Logical AND
||	Logical OR

Operator Precedence

Level	Description	Operators	Associativity
16	parentheses	( )	Left-to-right
15	post inc/dec	++, --	Left-to-right
14	**logical NOT**	**!**	Right-to-Left
13	cast	()	Right-to-Left
12	multiplicative	*, /, %	Left-to-right
11	additive	+, -	Left-to-right
9	relational	>, >=, <, <=	Left-to-right
8	equality	==, !=	Left-to-right
4	**logical AND**	**&&**	Left-to-right
3	**logical OR**	**||**	Left-to-right
1	assignment	=, +=, -= *=, /=, %=	Right-to-Left

Truth Tables

Input	!
false	**true**
true	**false**

Inputs		&&
false	false	**false**
false	true	**false**
true	false	**false**
true	true	**true**

Inputs		||
false	false	**false**
false	true	**true**
true	false	**true**
true	true	**true**

Truth Tables

Input	!
0	**1**
1	**0**

Inputs		&&
0	0	**0**
0	1	**0**
1	0	**0**
1	1	**1**

Inputs		||
0	0	**0**
0	1	**1**
1	0	**1**
1	1	**1**

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Testing Logical Operators

```
public static void main(String args[]) {
   System.out.println("Starting Program...");
   if(true && false) {
      System.out.println("Hello World!");
   } else {
      System.out.println(“Goodbye cruel world…”);
   }
   System.out.println("Finished Program!");
}
```

Testing Logical Operators

```
public static void main(String args[]) {
   System.out.println("Starting Program...");
   if(true && false) {
      System.out.println("Hello World!");
   } else {
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   }
   System.out.println("Finished Program!");
}
```

```
Starting Program…
Goodbye cruel world...
Finished Program!
```

Testing Logical Operators

```
public static void main(String args[]) {
   System.out.println("Starting Program...");
   if (true && 5) {
      System.out.println("Hello World!");
   } else {
      System.out.println("Goodbye cruel world...");
   }
   System.out.println("Finished Program!");
}
```

Testing Logical Operators

```
public static void main(String args[]) {
   System.out.println("Starting Program...");
   if (true && 5) {
      System.out.println("Hello World!");
   } else {
      System.out.println("Goodbye cruel world...");
   }
   System.out.println("Finished Program!");
}
```

```
ERROR:
The operator && is undefined for the
argument type(s) boolean, int
```

`boolean` and `if`

Logical Operators