

# Princeton University

## COS 217: Introduction to Programming Systems

### C Operators

**Grouped by Category:**

Operator	Precedence	Category	Description	Associativity
++	2	arithmetic	Increment	R to L
--	2	arithmetic	Decrement	R to L
+	2	arithmetic	Unary positive	R to L
-	2	arithmetic	Unary negative	R to L
*	3	arithmetic	Multiplication	L to R
/	3	arithmetic	Division	L to R
%	3	arithmetic	Modulus	L to R
+	4	arithmetic	Addition	L to R
-	4	arithmetic	Subtraction	L to R
=	14	assignment	Assignment	R to L
+=	14	assignment	Addition and assignment	R to L
-=	14	assignment	Subtraction and assignment	R to L
*=	14	assignment	Multiplication and assignment	R to L
/=	14	assignment	Division and assignment	R to L
%=	14	assignment	Modulus and assignment	R to L
<	6	relational	Less than	L to R
<=	6	relational	Less than or equal to	L to R
>	6	relational	Greater than	L to R
>=	6	relational	Greater than or equal to	L to R
==	7	relational	Equality	L to R
!=	7	relational	Inequality	L to R
!	2	logical	Logical "not"	R to L
&&	11	logical	Logical "and"	L to R
	12	logical	Logical "or"	L to R
[]	1	pointer	Array element select	L to R
*	2	pointer	Dereference	R to L
&	2	pointer	Address of	R to L
->	1	structure	Structure dereference and field select	L to R
.	1	structure	Structure field select	L to R
~	2	bitwise	Bitwise "not"	R to L
<<	5	bitwise	Bitwise shift left	L to R
>>	5	bitwise	Bitwise shift right	L to R
&	8	bitwise	Bitwise "and"	L to R
^	9	bitwise	Bitwise "exclusive or"	L to R
	10	bitwise	Bitwise "or"	L to R
&=	14	bitwise	Bitwise "and" and assignment	R to L
^=	14	bitwise	Bitwise "exclusive or" and assignment	R to L
=	14	bitwise	Bitwise "or" and assignment	R to L
<<=	14	bitwise	Bitwise left shift and assignment	R to L
>>=	14	bitwise	Bitwise right shift and assignment	R to L
()	1	function	Function call	L to R
(type)	2	cast	Cast	R to L
sizeof	2	sizeof	size of (completetime)	R to L
?:	13	ternary	Conditional expression (ternary)	R to L
,	15	sequence	Sequence	L to R

## Differences between C and Java

### Java only:

>>>	Right shift with zero extension
new	Create an object
instanceof	Is left operand an object of class right-operand?

### C only:

->	structure member select
*	dereference
&	address of
,	sequence
sizeof	compile-time sizeof

### Related to type boolean:

Java:	Relational and logical operators evaluate to type <code>boolean</code>
C:	Relational and logical operators evaluate to type <code>int</code>
Java:	Logical operators take operands of type <code>boolean</code>
C:	Logical operators take operands of type <code>int</code>

### Related to class String:

Java:	Operators <code>+</code> and <code>+=</code> can concatenate <code>String</code> objects
C:	Operators <code>+</code> and <code>+=</code> do not concatenate <code>String</code> objects – because there are no <code>String</code> objects

Java: Demotions are not automatic

C: Demotions are automatic

```
int i ;
char c;
...
i = c;          /* Implicit promotion. */
               /* OK in Java and C. */

c = i;          /* Implicit demotion. */
               /* Java: Compiletime error. */
               /* C: OK. Truncation without warning. */

c = (char)i;   /* Explicit demotion. */
               /* Java: Truncation without warning. */
               /* C: Truncation without warning. */
```

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