Operators

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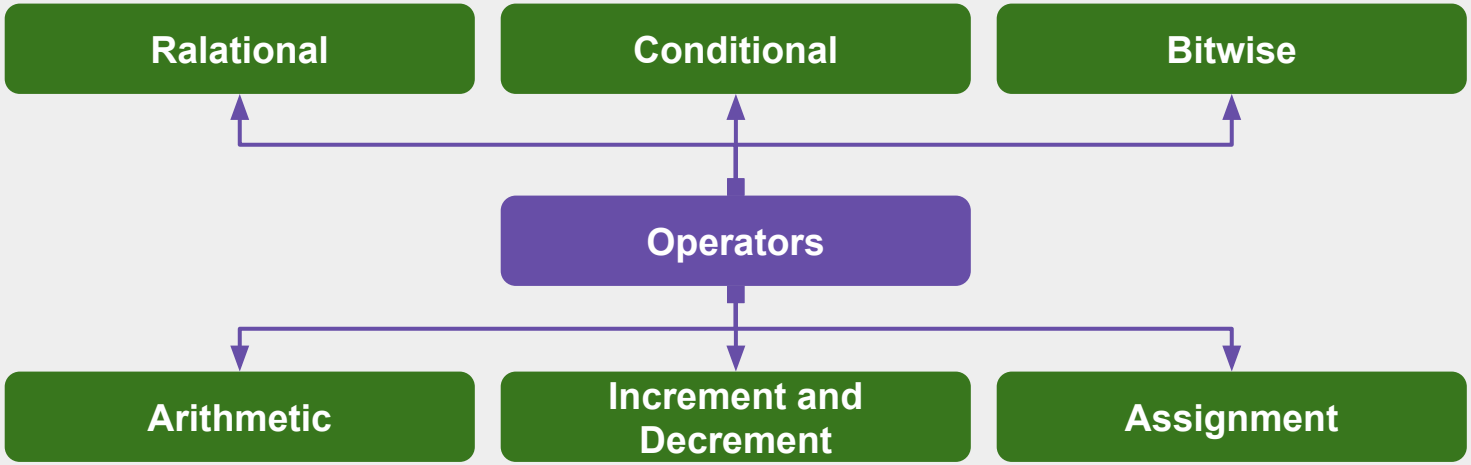
Operators

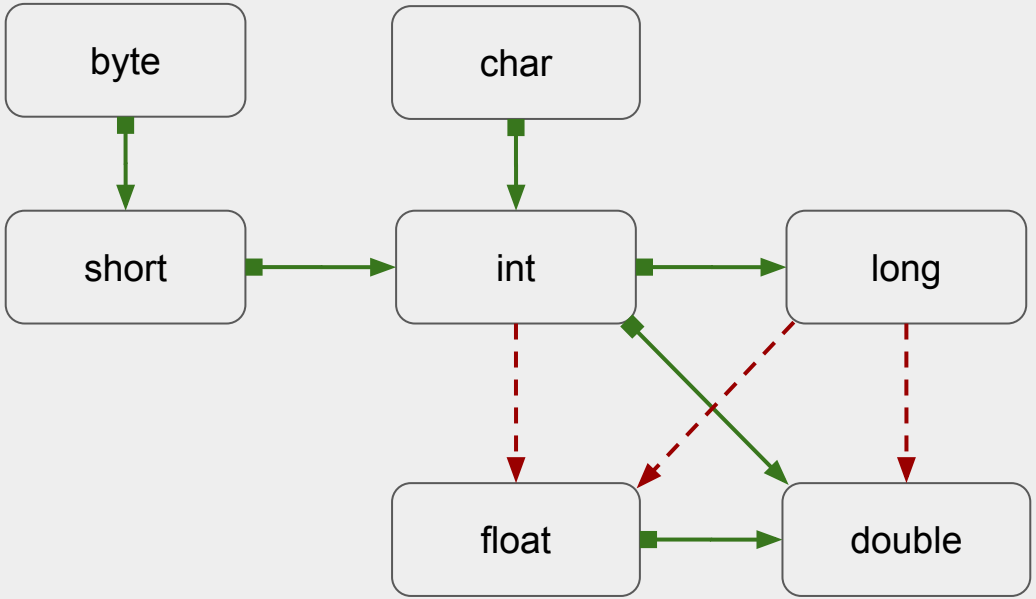
Operators are used to combine values



Arithmetic Operators

addition	**+**
subtraction	**-**
multiplication	*****
division	**/**
Integer remainder(modulus)	**%**

Conversions between Numeric Types



- The six solid arrows denote conversions without information loss.
- The three dashed arrows denote conversions that may lose precision.

```
int n = 123456789;
float f = n; // f is 1.23456792E8
```

Conversions between Numeric Types

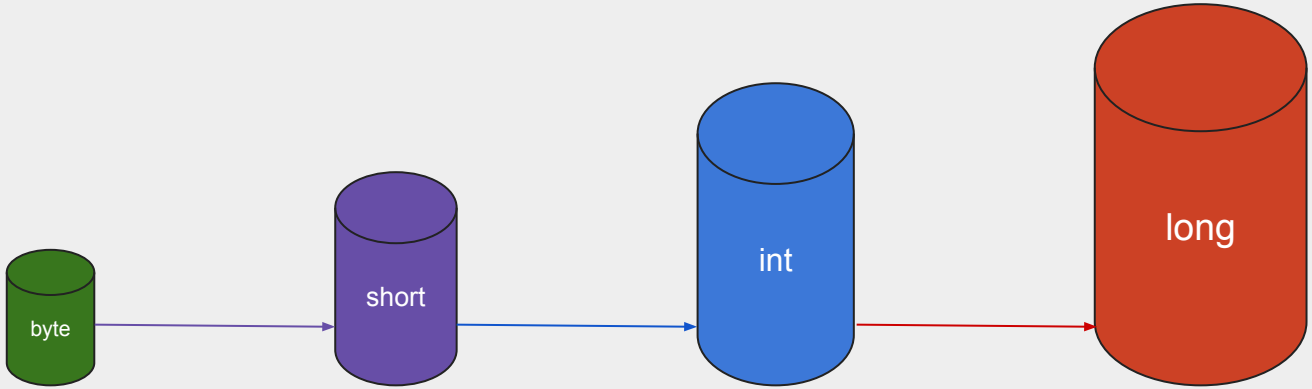
When two values are combined with a binary operator (such as n + f where n is an integer and f is a floating-point value), both operands are converted to a common type before the operation is carried out.

- If either of the operands is of type double, the other one will be converted to a double.
- Otherwise, if either of the operands is of type float, the other one will be converted to a float.
- Otherwise, if either of the operands is of type long, the other one will be converted to a long.
- Otherwise, both operands will be converted to an int.

Casts

- Widening Casting (automatically) - converting a smaller type to a larger type size

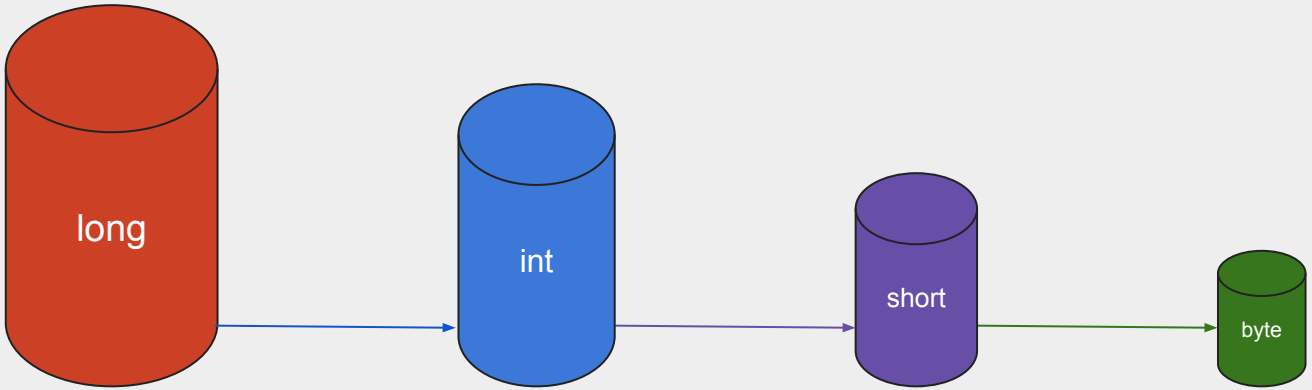
```
byte -> short -> char -> int -> long -> float -> double
```



Casts

- Narrowing Casting (manually) - converting a larger type to a smaller size type

```
double -> float -> long -> int -> char -> short -> byte
```



The Assignment Operators

There is a convenient shortcut for using binary operators in an assignment.

```
x += 4; //is equivalent to x = x + 4;
x += 3.5; //is valid
int y = x += 4; //is valid
```

The Assignment Operators

=	int c = 12;
+=	c+=2 is roughly the same as c = c + 2
-=	c-=2 is roughly the same as c = c - 2
*=	c*=2 is roughly the same as c = c * 2
/=	c/=2 is roughly the same as c = c / 2
%=	c%=2 is roughly the same as c = c % 2
<<=	c<<=2 is roughly the same as c = c << 2
>>=	c>>=2 is roughly the same as c = c >> 2
&=	c&=2 is roughly the same as c = c & 2
|=	c|=2 is roughly the same as c = c | 2
^=	c^=2 is roughly the same as c = c ^ 2

Increment and Decrement Operators

One of the most common operations with a numeric variable is to add or subtract 1. Java, following in the footsteps of C and C++, has both increment and decrement operators

```
int n = 12;
n++;
```

Since these operators change the value of a variable, they cannot be applied to numbers themselves.

```
4++; // is not a legal statement.
```

There are two forms of these operators ***postfix form(n++)*** and ***prefix form(++n)***. The difference between the two appears only when they are used inside expressions.

```
int m = 7;
int n = 7;
int a = 2 * ++m; // now a is 16, m is 8
int b = 2 * n++; // now b is 14, n is 8
```

Relational Operators

==	equality sign
>	greater than sign
<	less than sign
>=	greater than or equal sign
<=	less than or equal sign

Relational Operators

`&&`	`expression1 && expression2`
`||`	`expression1 || expression2`
`!`	`!expression1`

a	b	a || b	a && b	!a
true	false	true	false	false
true	true	true	true	false
false	true	true	false	true
false	false	false	false	true

Conditional Operator

Java provides the ***conditional ?: operator*** that selects a value, depending on a Boolean expression. The expression *condition ? expression1 : expression2* evaluates to the first expression if the condition is true, to the second expression otherwise. Sometimes a **conditional operator** is called a **ternary operator**.

```
int min = x < y ? x : y;
```

The Bitwise operators

- Bitwise OR (|)
- Bitwise AND (&)
- Bitwise XOR (^)
- Bitwise Complement (~)

x	y	|
1	1	1
1	0	1
0	1	1
0	0	0

x	y	&
1	1	1
1	0	1
0	1	1
0	0	0

x	y	^
1	1	0
1	0	1
0	1	1
0	0	0

The Shifting Operators

```
int x = 11;
n = 1;
```

x_{binary}

Left shift << n

`x << n;`

Right shift >> n

`x >> n;`

Operator Precedence

If no parentheses are used, Operators on the same level are processed from left to right, except for those that are right-associative, as indicated in the table. For example, && has a higher precedence than ||, so the expression

```
a && b || c means (a && b) || c
```

Since += associates right to left, the expression

```
a += b += c means a += (b += c)
```

Java Operator Precedence Table

Interview Questions