Conditions in Java

Java conditions are <u>Boolean expressions</u>.

They can often be quite simple:
- **true** ⎤
- **false** ⎦ boolean literals
- `age == 4`
- `x < 6`
- `height != width`
- `name.equals("Ahmed")`
- `keyboard.nextBoolean()`
- `a variable of type boolean`

Conditions in Java

…and they can also express more complex ideas

Boolean expressions can be combined using *logical* operators

     && – and

     || – or

     ! – not

For example:
- `age == 4  || weight >= 40`
- `width == 32 &&  !(height < 46)`

Truth Tables

A	!A
F	??
T	??

A	B	A || B
F	F	??
F	T	??
T	F	??
T	T	??

A	B	A && B
F	F	??
F	T	??
T	F	??
T	T	??

Truth Tables

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F	T
T	F

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F	F	??
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T	F	??
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A	B	A && B
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Truth Tables

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T	T	??

A	B	A && B
F	F	F
F	T	F
T	F	F
T	T	T

Truth Tables

A	!A
F	T
T	F

A	B	A || B
F	F	F
F	T	T
T	F	T
T	T	T

Note: This is Inclusive OR

A	B	A && B
F	F	F
F	T	F
T	F	F
T	T	T

Truth Tables

A	!A
0	1
1	0

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

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

0 is false
1 is true

Operator Precedence

What do we mean by:

A || B && C

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A	B	C	(A || B) && C
T	T	T	T
T	T	F	F
T	F	T	T
T	F	F	F
F	T	T	T
F	T	F	F
F	F	T	F
F	F	F	F

A	B	C	A || (B && C)
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	T
F	T	F	F
F	F	T	F
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T	T	T	T
T	T	F	F
T	F	T	T
T	F		
F	T		
F	T	F	F
F	F	T	F
F	F	F	F

A	B	C	A || (B && C)
T	T	T	T
T	T	F	T
T	F	T	T
T	F	F	T
F	T	T	T
F	T	F	F
F	F	T	F
F	F	F	F

Operator Precedence

!   ↑   Highest

&&

|| ↓   Lowest
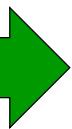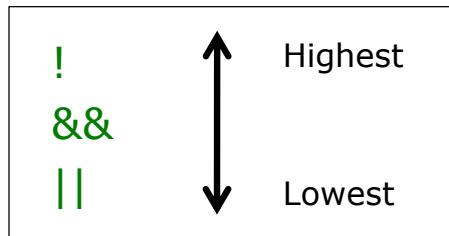
For Example:

A || B && C ➜ A || (B && C)

!A && B ➜ (!A) && B

A || !C && B ➜ A || ((!C) && B)