

Objectives

- Conditionals

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Making Decisions

- Sometimes, we do things only if some other condition holds ("is true")
- Examples
 - > If it is raining outside
 - Then, I will take an umbrella
 - > If it is raining and it is cold
 - Then, I will wear a raincoat
 - > If it is Saturday or it is Sunday
 - Then, I will wake up at 10 a.m.
 - Otherwise, I wake up at 7 a.m.
 - > If the shirt is purple or the shirt is on sale and blue
 - Then, I will buy the shirt

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Conditionals

- Sometimes, we only want to execute a statement in certain cases
 - > Example: Finding the absolute value of a number
 - $|4| = 4$
 - $|-10| = 10$
 - > To get the answer, we only want to multiply the number by -1 if it's a negative number
 - > Code:

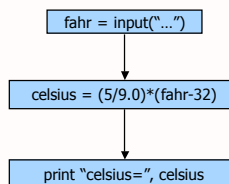
```
if x < 0 :
    x *= -1;
```

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Typical Execution



So far, we've thought of programs as a *sequence* of statements.

Statements execute in order.

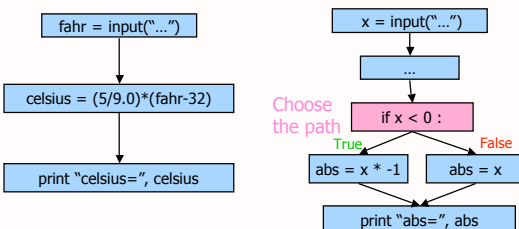
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If Statements

- Change the **control flow** of the program



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Other "things" that change control flow

- For loops
 - > Repeats a loop body a fixed number of times before going to the next statement after the for loop
- Function calls
 - > "Go execute some other code and then come back with the result"

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Syntax of **if** statement: Simple Decision

if condition :

```

statement1
statement2
...
statementn
    
```

keyword

"then" Body

English Examples:

```

if it is raining :
    I will wear a raincoat
if the PB is new :
    Remove the seal
    
```

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Conditionals

- Syntax:
 - > <expression> <relational_operator><expression>
- Return either True or False
 - > Boolean type

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Relational Operators

- Syntax:
 - > <expression> <relational_operator><expression>

Relational Operator	Meaning
<	Less than?
<=	Less than or equal to?
>	Greater than?
>=	Greater than or equal to?
==	Equals?
!=	Not equals?

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Use Python shell

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Examples: Using Conditionals

- Determine if a number is even or odd


```

x = input("Enter a number: ")
if x%2 == 0 :
    print x, "is even"
if x%2 == 1:
    print x, "is odd"
            
```

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evenorodd.py

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Assignment operator vs. Equality operator

- Assignment operator: =
- Equality operator: ==

```

x=input("Enter a number: ")
remainder = x%2;
if remainder = 0 : ← Syntax error
    print x, "is even."
    
```

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Syntax of **if** statement: Two-Way Decision

English Example:

```

if it is Saturday or Sunday :
    I wake up at 10 a.m.
else :
    I wake up at 7 a.m.
    
```

keywords

"then" Body

"else" Body

```

if condition :
    statement1
    statement2
    ...
    statementn
else :
    statement1
    statement2
    ...
    statementn
    
```

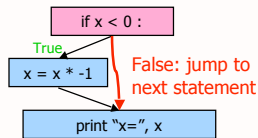
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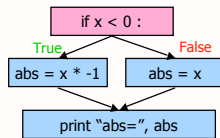
If-Else statements (absolute values)

If statement



```
if x < 0 :
    x = x * -1
print "x=", x
```

If-else statement



```
if x < 0 :
    abs = x * -1
else :
    abs = x
print "abs=", abs
```

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Examples: Using Conditionals

- Determine if a number is even or odd
 - More efficient implementation

```
x = input("Enter a number: ")
if x%2 == 0 :
    print x, "is even"
else:
    print x, "is odd"
```

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Practice: Draw the Flow Chart

```
print "This program determines your birth year"
print "given your age and current year"
print
age = input("Enter your age >> ")
if age > 110:
    print "Don't be ridiculous, you can't be that old."
else:
    currentYear = input("Enter the current year >> ")
    birthyear = currentYear - age
    print
    print "You were either born in", birthyear, "or", birthyear-1
```

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Practice: Speeding Ticket Fines

- Any speed clocked over the limit results in a fine of at least \$50, plus \$5 for each mph over the limit, plus a penalty of \$200 for any speed over 90mph.
- Let's write a program that will take as input the speed limit and the clocked speed. It will then print that the clocked speed was under the limit or it will print the appropriate fine.

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Syntax of **if** statement: Multi-Way Decision

keywords

```
if condition :
    <then-body1>
elif condition :
    <then-body2>
elif condition :
    <then-body3>
...
else :
    <default-body>
```

English Example:

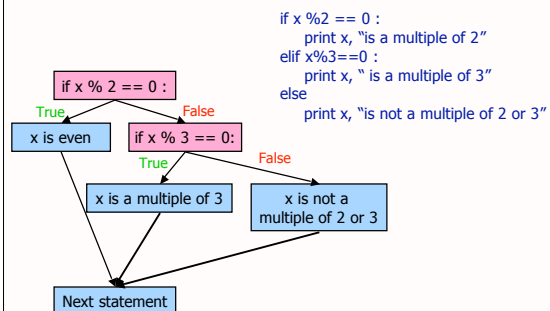
```
if it is Saturday:
    I wake up at 10 a.m.
elif it is Sunday:
    I wake up at 9 a.m.
else :
    I wake up at 7 a.m.
```

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If-Else-If statements



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Friday: Wikipedia

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