CSIT110 / CSIT810

Python

Lecture 5

Dr. Joseph Tonien

School of Computing and Information Technology
University of Wollongong

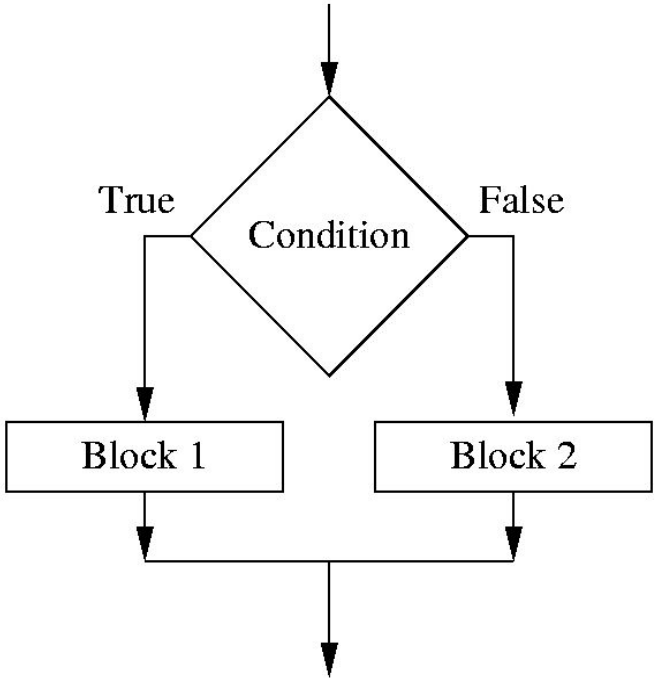
Objectives

Understanding of:

- Decision making: if - else
- Block of codes and Indentation

if - else

if - else




```
if (some condition):
    block 1 statements
    …
else:
    block 2 statements
    ...
```

Example 1

Number of items	**Cost**
1-50	$3 per item Postage: $10
More than 50	$2 per item Postage: free

Example 1

Number of items	Cost
1-50	$3 per item Postage: $10
More than 50	$2 per item Postage: free

If the user buys 10 item:

```
Item cost = $3 x 10 = $30
Postage: $10

Total cost: $40
```

Example 1

Number of items	Cost
1-50	$3 per item Postage: $10
More than 50	$2 per item Postage: free

If the user buys 100 item:

```
Item cost = $2 x 100 = $200
Postage: free

Total cost: $200
```

Example 1

```
# get the number of items from the user

item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost

if (item_count <= 50):

else:
```

Example 1

```
# get the number of items from the user

item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost

if (item_count <= 50):
    unit_price = 3
    postage = 10
    total_cost = unit_price * item_count + postage

    print("Total cost: ${0}".format(total_cost))
else:
```

Example 1

```
# get the number of items from the user

item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost

if (item_count <= 50):
    unit_price = 3
    postage = 10
    total_cost = unit_price * item_count + postage

    print("Total cost: ${0}".format(total_cost))
else:
    unit_price = 2
    total_cost = unit_price * item_count

    print("Total cost: ${0}".format(total_cost))
```

Example 1

```
# get the number of items from the user

item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost

if (item_count <= 50):

  unit_price = 3
  postage = 10
  total_cost = unit_price * item_count + postage

  print("Total cost: ${0}".format(total_cost))

else:

  unit_price = 2
  total_cost = unit_price * item_count

  print("Total cost: ${0}".format(total_cost))
```

Example 1 - *another solution*

```
# get the number of items from the user
item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost
if (item_count <= 50):
    unit_price = 3
    postage = 10
    total_cost = unit_price * item_count + postage
else:
    unit_price = 2
    total_cost = unit_price * item_count
print("Total cost: ${0}".format(total_cost))
```

Example 1 - *another solution*

```
# get the number of items from the user
item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost
if (item_count <= 50):
    unit_price = 3
    postage = 10
    total_cost = unit_price * item_count + postage

else:
    unit_price = 2
    total_cost = unit_price * item_count

print("Total cost: ${0}".format(total_cost))
```

```
Enter the quantity: 10
Total cost: $40
```

Example 1 - *another solution*

```
# get the number of items from the user
item_input = input("Enter the quantity: ")
item_count = int(item_input)

# calculate the cost
if (item_count <= 50):
    unit_price = 3
    postage = 10
    total_cost = unit_price * item_count + postage

else:
    unit_price = 2
    total_cost = unit_price * item_count

print("Total cost: ${0}".format(total_cost))
```

```
Enter the quantity: 100
Total cost: $200
```

if - elif - elif - … - else

if - elif - elif - … - else

```
if (condition1):
  # condition1 is true.
  statement
  statement
  ...
elif (condition2):
  # condition1 is false and condition2 is true.
  statement
  statement
  ...
elif (condition3):
  # condition1 is false, condition2 is false, and condition3 is true
  statement
  statement
  ...
else:
  # condition1, condition2, and condition3 are false.
  statement
  statement
  ...
```

Example 2

Number of items	Cost
1-50	$3 per item Postage: Standard post: $10 Registered post: $15 Express post: $20
More than 50	$2 per item Postage: Standard post: free Registered post: $15 Express post: $20

10 items + Registered Post

```
Item cost = $3 x 10 = $30
Postage: $15
Total cost: $45
```

Example 2

Number of items	Cost
1-50	$3 per item Postage: Standard post: $10 Registered post: $15 Express post: $20
More than 50	$2 per item Postage: Standard post: free Registered post: $15 Express post: $20

100 items + Registered Post

```
Item cost = $2 x 100 = $200
Postage: $15
Total cost: $215
```

Example 2

Number of items	Cost
1-50	$3 per item Postage: Standard post: $10 Registered post: $15 Express post: $20
More than 50	$2 per item Postage: Standard post: free Registered post: $15 Express post: $20

100 items + Standard Post

```
Item cost = $2 x 100 = $200
Postage: free
Total cost: $200
```

Example 2

```
# get the number of items from the user
item_input = input("Enter the quantity: ")
item_count = int(item_input)

# get the shipping method Standard/Registered/Express?
shipping = input("Shipping method (s/r/e): ")

# calculate the cost
```

Example 2

```
# calculate the cost

# determine the unit price




# determine the postage




# determine the total cost
```

Example 2

```
# determine the unit price

if (item_count <= 50):
    unit_price = 3

else:
    unit_price = 2
```

Example 2

```
# determine the postage

if (shipping == "s"):
    # standard post

elif (shipping == "r"):
    # registered post

else:
    # express post
```

Example 2

```
# determine the postage

if (shipping == "s"):
  # standard post $10 for 1-50 items, free for > 50 items

  if (item_count <= 50):
    postage = 10
  else:
    postage = 0

elif (shipping == "r"):
  # registered post




else:
  # express post
```

Example 2

```
# determine the postage

if (shipping == "s"):
  # standard post $10 for 1-50 items, free for > 50 items

  if (item_count <= 50):
    postage = 10
  else:
    postage = 0

elif (shipping == "r"):
  # registered post $15
  postage = 15



else:
  # express post



```

Example 2

```
# determine the postage

if (shipping == "s"):
  # standard post $10 for 1-50 items, free for > 50 items

  if (item_count <= 50):
    postage = 10
  else:
    postage = 0

elif (shipping == "r"):
  # registered post $15
  postage = 15



else:
  # express post $20
  postage = 20
```

Example 2

```
# determine the total cost

total_cost = unit_price * item_count + postage

print("Total cost: ${0}".format(total_cost))
```

Example 3

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0

# ask user to enter the mark



# determine the grade based on mark



# display the mark and grade
```

Example 3

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0

# ask user to enter the mark

mark_input = input("Please enter mark: ")
mark = int(mark_input)


# determine the grade based on mark



# display the mark and grade
```

Example 3

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0

# determine the grade based on mark

if (mark >= 80):
  grade = "A"

elif (mark >= 60):
  grade = "B"

elif (mark >= 40):
  grade = "C"

else:
  grade = "D"
```

Example 3

```
# display the mark and grade

print("Mark {0}, Grade {1}".format(mark, grade))
```

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0
mark_input = input("Please enter mark: ")
mark = int(mark_input)

if (mark >= 80):
  grade = "A"
elif (mark >= 60):
  grade = "B"
elif (mark >= 40):
  grade = "C"
else:
  grade = "D"

print("Mark {0}, Grade {1}".format(mark, grade))
```

mark is greater than or equal to 80

```
Please enter mark: 90
Mark 90, Grade A
```

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0
mark_input = input("Please enter mark: ")
mark = int(mark_input)

if (mark >= 80):
  grade = "A"
elif (mark >= 60):
  grade = "B"
elif (mark >= 40):
  grade = "C"
else:
  grade = "D"

print("Mark {0}, Grade {1}".format(mark, grade))
```



```
Please enter mark: 62
Mark 62, Grade B
```

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0
mark_input = input("Please enter mark: ")
mark = int(mark_input)

if (mark >= 80):
  grade = "A"
elif (mark >= 60):
  grade = "B"
elif (mark >= 40):
  grade = "C"
else:
  grade = "D"

print("Mark {0}, Grade {1}".format(mark, grade))
```



```
Please enter mark: 45
Mark 45, Grade C
```

```
#grade A: 100-80, B: 79-60, C: 59-40, D: 39-0
mark_input = input("Please enter mark: ")
mark = int(mark_input)

if (mark >= 80):
  grade = "A"
elif (mark >= 60):
  grade = "B"
elif (mark >= 40):
  grade = "C"
else:
  grade = "D"

print("Mark {0}, Grade {1}".format(mark, grade))
```

```
Please enter mark: 15
Mark 15, Grade D
```

if (alone)

```
if (some condition):
  statements
  ...
```

```
input1 = input("Enter the 1st integer: ")
n1 = int(input1)
input2 = input("Enter the 2nd integer: ")
n2 = int(input2)
input3 = input("Enter the 3rd integer: ")
n3 = int(input3)

max_n = n1

if (n2 > max_n):
  max_n = n2

if (n3 > max_n):
  max_n = n3

print("Max of {0}, {1}, {2} is {3}".format(n1, n2, n3, max_n))
```

What is this program trying to do?

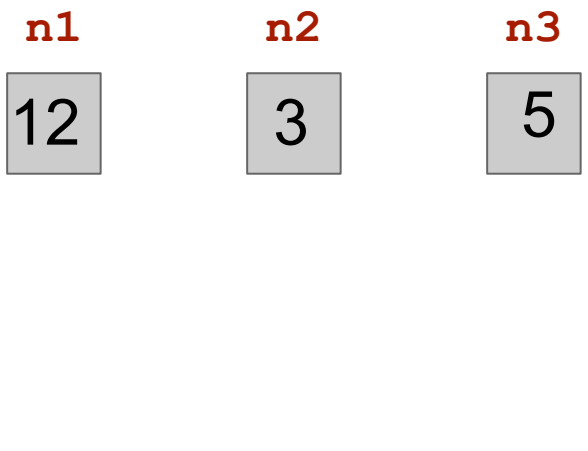
```
input1 = input("Enter the 1st integer: ")
n1 = int(input1)
input2 = input("Enter the 2nd integer: ")
n2 = int(input2)
input3 = input("Enter the 3rd integer: ")
n3 = int(input3)

max_n = n1

if (n2 > max_n):
  max_n = n2

if (n3 > max_n):
  max_n = n3

print("Max of {0}, {1}, {2} is {3}".format(n1, n2, n3, max_n))
```



senario 1

```
Enter the 1st integer: 12
Enter the 2nd integer: 3
Enter the 3rd integer: 5
Max of 12, 3, 5 is 12
```

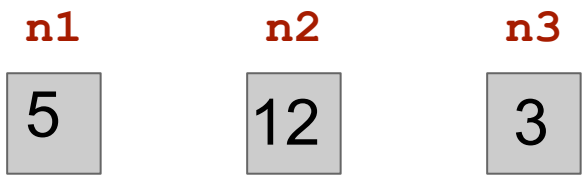
```
input1 = input("Enter the 1st integer: ")
n1 = int(input1)
input2 = input("Enter the 2nd integer: ")
n2 = int(input2)
input3 = input("Enter the 3rd integer: ")
n3 = int(input3)

max_n = n1

if (n2 > max_n):
  max_n = n2

if (n3 > max_n):
  max_n = n3

print("Max of {0}, {1}, {2} is {3}".format(n1, n2, n3, max_n))
```



max_n 5

max_n 12

senario 2

```
Enter the 1st integer: 5
Enter the 2nd integer: 12
Enter the 3rd integer: 3
Max of 5, 12, 3 is 12
```

```
input1 = input("Enter the 1st integer: ")
n1 = int(input1)
input2 = input("Enter the 2nd integer: ")
n2 = int(input2)
input3 = input("Enter the 3rd integer: ")
n3 = int(input3)

max_n = n1

if (n2 > max_n):
  max_n = n2

if (n3 > max_n):
  max_n = n3

print("Max of {0}, {1}, {2} is {3}".format(n1, n2, n3, max_n))
```

n1	n2	n3
5	3	12

max_n 5

max_n 12

senario 3

```
Enter the 1st integer: 5
Enter the 2nd integer: 3
Enter the 3rd integer: 12
Max of 5, 3, 12 is 12
```

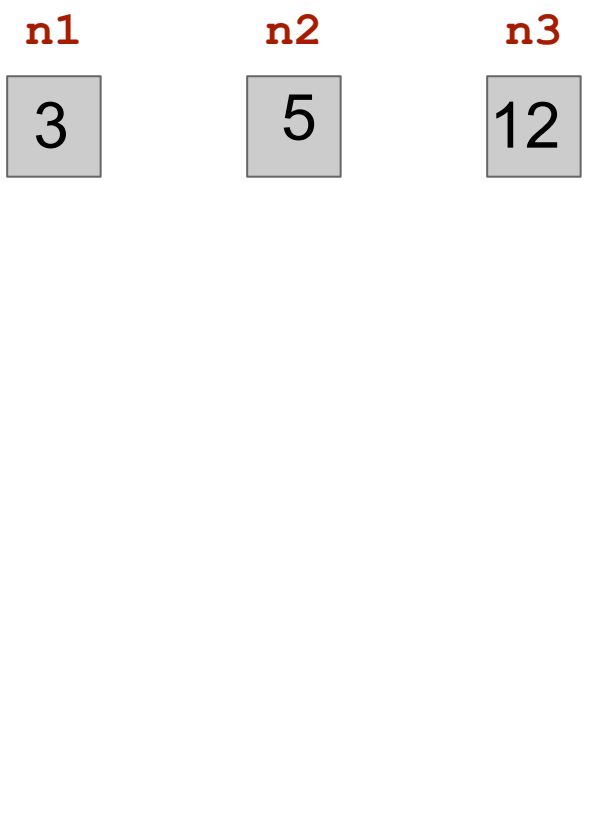
```
input1 = input("Enter the 1st integer: ")
n1 = int(input1)
input2 = input("Enter the 2nd integer: ")
n2 = int(input2)
input3 = input("Enter the 3rd integer: ")
n3 = int(input3)

max_n = n1

if (n2 > max_n):
  max_n = n2

if (n3 > max_n):
  max_n = n3

print("Max of {0}, {1}, {2} is {3}".format(n1, n2, n3, max_n))
```



senario 4

```
Enter the 1st integer: 3
Enter the 2nd integer: 5
Enter the 3rd integer: 12
Max of 3, 5, 12 is 12
```

Equality

Equality

```
if (number1 == 5):
  # number1 is equal to 5

if (number1 == number2):
  # number1 is equal to number2

if (your_answer == “Y”):
  # your_answer is equal to “Y”

if (student_name == “John”):
  # student_name is equal to “John”
```

Equality

```
if (number1 == 5):
  # number1 is equal to 5

if (number1 == number2):
  # number1 is equal to number2

if (your_answer == “Y”):
  # your_answer is equal to “Y”

if (student_name == “John”):
  # student_name is equal to “John”
```

Remember the double equal sign ==

Inequality

Inequality

```
if (number1 != 5):
  # number1 is not equal to 5

if (number1 != number2):
  # number1 is not equal to number2

if (your_answer != “Y”):
  # your_answer is not equal to “Y”

if (student_name != “John”):
  # student_name is not equal to “John”
```

Comparison

Comparison

```
if (number1 < 5):
  # number1 is less than 5


if (number1 <= 5):
  # number1 is less than or equal to 5


if (number1 > 5):
  # number1 is greater than 5


if (number1 >= 5):
  # number1 is greater than or equal to 5
```

Logical And, Or, Negation

Logical And

```
if ((number1 > 5) and (number1 < 10)):
  # number1 is greater than 5 AND less than 10


if ((age > 40) and (student_type == “Domestic”)):
  # age is greater than 40
  # AND student_type is equal to “Domestic”
```

Logical Or

```
if ((number1 < 1000) or (number1 > 5000)):
  # number1 is less than 1000
  # OR greater than 5000
```

```
if ((student_type == “Exchange” or (student_type ==
“Domestic”)):
  # student_type is equal to “Exchange”
  # OR is equal to “Domestic”
```

Logical Negation

```
if (not (number1 == 1000)):
  # number1 is not equal to 1000
```

Science Park Demo

```
# show menu
print("-----------------------------------------------")
print("          Welcome to Science Park!             ")
print()
print("Admission Charges: Adult $35, Child $20        ")
print("Stargazing Show: $10/person                    ")
print()
print("Free Science Park Hats if you spend $150 or more")
print("10% discount if you spend $200 or more         ")
print("-----------------------------------------------")
print()
```

```
# take order from user
print("Please make your order.")
print()

# ask number of adults
adult_input = input("Enter number of adults: ")
adult = int(adult_input)

# ask number of children
child_input = input("Enter number of children: ")
child = int(child_input)

# ask the additional star show
star_show_input = input("Add Stargazing Show: (Y/N) ")
```

```
ADULT_PRICE = 35
CHILD_PRICE = 20
SHOW_PRICE = 10

# calculate the total charge, no discount calculation yet
adult_cost = ADULT_PRICE * adult
child_cost = CHILD_PRICE * child

if ((star_show_input == "Y") or (star_show_input == "y")):
  show_cost = SHOW_PRICE * (adult + child)
else:
  show_cost = 0

total_cost = adult_cost + child_cost + show_cost
```

```
DISCOUNT_MIN = 200 # the minimum amount to have discount
DISCOUNT_PCT = 10  # the discount percentage

# calculate the final charge, take discount into consideration
if (total_cost >= DISCOUNT_MIN):
  # eligible for discount
  final_cost = total_cost * (100 - DISCOUNT_PCT) / 100

  print("Total cost: ${0}".format(total_cost))
  print("Discount {0}%".format(DISCOUNT_PCT))
  print("Final charge: ${0}".format(final_cost))
else:
  # not eligible for discount
  final_cost = total_cost

  print("Final charge: ${0}".format(final_cost))
```

```
FREE_HAT_MIN = 150 # the minimum amount to have free hat

# check Free Hat
if (total_cost >= FREE_HAT_MIN):
  print("Please collect your free Science Park Hats at the
counter.")

print()
print("Enjoy your day!!!")
```

Magic Square Demo

```
print("Magic square")
print("m11  m12  m13")
print("m21  m22  m23")
print("m31  m32  m33")
```

Numbers in each row, and in each column,
and in each diagonals, all add up to the same number!

```
#get user input
input11 = input("Enter m11: ")
m11 = int(input11)
input12 = input("Enter m12: ")
m12 = int(input12)
input13 = input("Enter m13: ")
m13 = int(input13)

input21 = input("Enter m21: ")
m21 = int(input21)
input22 = input("Enter m22: ")
m22 = int(input22)
input23 = input("Enter m23: ")
m23 = int(input23)

input31 = input("Enter m31: ")
m31 = int(input31)
input32 = input("Enter m32: ")
m32 = int(input32)
input33 = input("Enter m33: ")
m33 = int(input33)
```

```
# display the square of numbers
print("{0:>10}{1:>10}{2:>10}".format(m11, m12, m13))
print("{0:>10}{1:>10}{2:>10}".format(m21, m22, m23))
print("{0:>10}{1:>10}{2:>10}".format(m31, m32, m33))
```

```
# calculate the sums

r1 = m11 + m12 + m13
r2 = m21 + m22 + m23
r3 = m31 + m32 + m33

c1 = m11 + m21 + m31
c2 = m12 + m22 + m32
c3 = m13 + m23 + m33

d1 = m11 + m22 + m33
d2 = m13 + m22 + m31

print("Row sums: {0}, {1}, {2}".format(r1, r2, r3))
print("Column sums: {0}, {1}, {2}".format(c1, c2, c3))
print("Diagonal sums: {0}, {1}".format(d1, d2))
```

```
# checking the magic square condition

if ((r2 == r1) and (r3 == r1) and (c1 == r1) and (c2 == r1) and
(c3 == r1) and (d1 == r1) and (d2 == r1)):
  print("This is a magic square")
else:
  print("This is not a magic square")
```

```
Magic square
m11  m12  m13
m21  m22  m23
m31  m32  m33
Enter m11: 2
Enter m12: 7
Enter m13: 6
Enter m21: 9
Enter m22: 5
Enter m23: 1
Enter m31: 4
Enter m32: 3
Enter m33: 8
```

```
        2        7        6
        9        5        1
        4        3        8
Row sums: 15, 15, 15
Column sums: 15, 15, 15
Diagonal sums: 15, 15
This is a magic square
```

Block and indentation

```
if (condition):
  this is
  a block
  of codes
  that is indented
  by the same amount
  of spaces
else:
  usually
  we use 2, 3 or 4 spaces for
  indentation
```

In Python, all the continuous lines indented with same number of spaces form a **block**.

All statements within the block must be indented the same amount.

We usually use 2, 3 or 4 spaces for indentation.

Common mistakes

```
if (condition):
  this is
  a block
  of codes
  that is indented
  by the same amount
  of spaces
else:
  usually
  we use 2, 3 or 4 spaces for
  indentation
```

Forget the colon **:**

Wrong indentation,
mix-up between spaces and tabs

Make your choice of indentation and use it consistently!