

CSX3001 / ITX3001





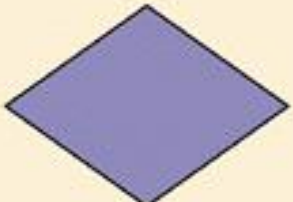
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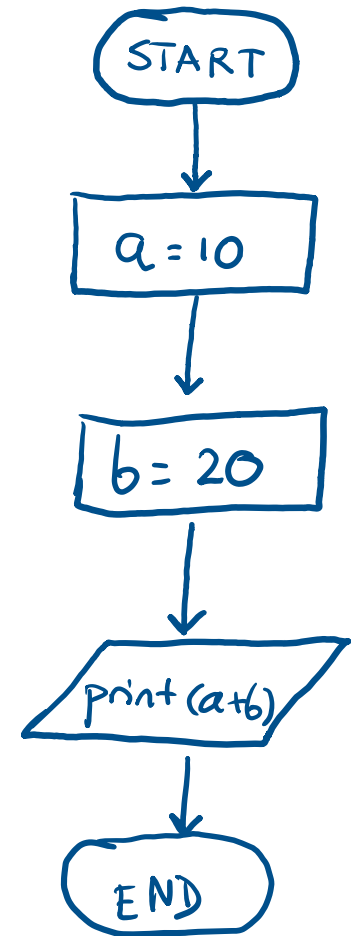
Fundamentals of Computer Programming

Today outline

- Introduction to Python, Anaconda, other IDEs
- Basic flowchart
- Numbering system
 - Base 10
 - Base 2
 - Base 16

Basic Flowchart Symbols

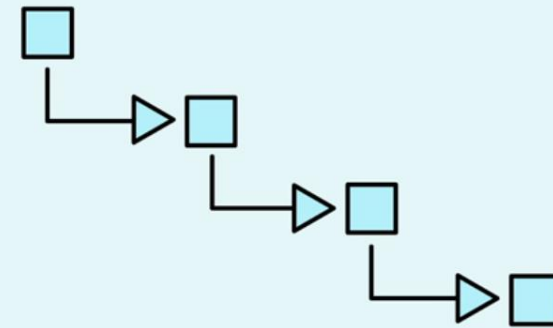
Name	Symbol	Use in flowchart
Oval		Denotes the beginning or end of a program.
Flow line		Denotes the direction of logic flow in a program.
Parallelogram		Denotes either an input operation (e.g., INPUT) or an output operation (e.g., PRINT).
Rectangle		Denotes a process to be carried out (e.g., an addition).
Diamond		Denotes a decision (or branch) to be made. The program should continue along one of two routes (e.g., IF/THEN/ELSE).

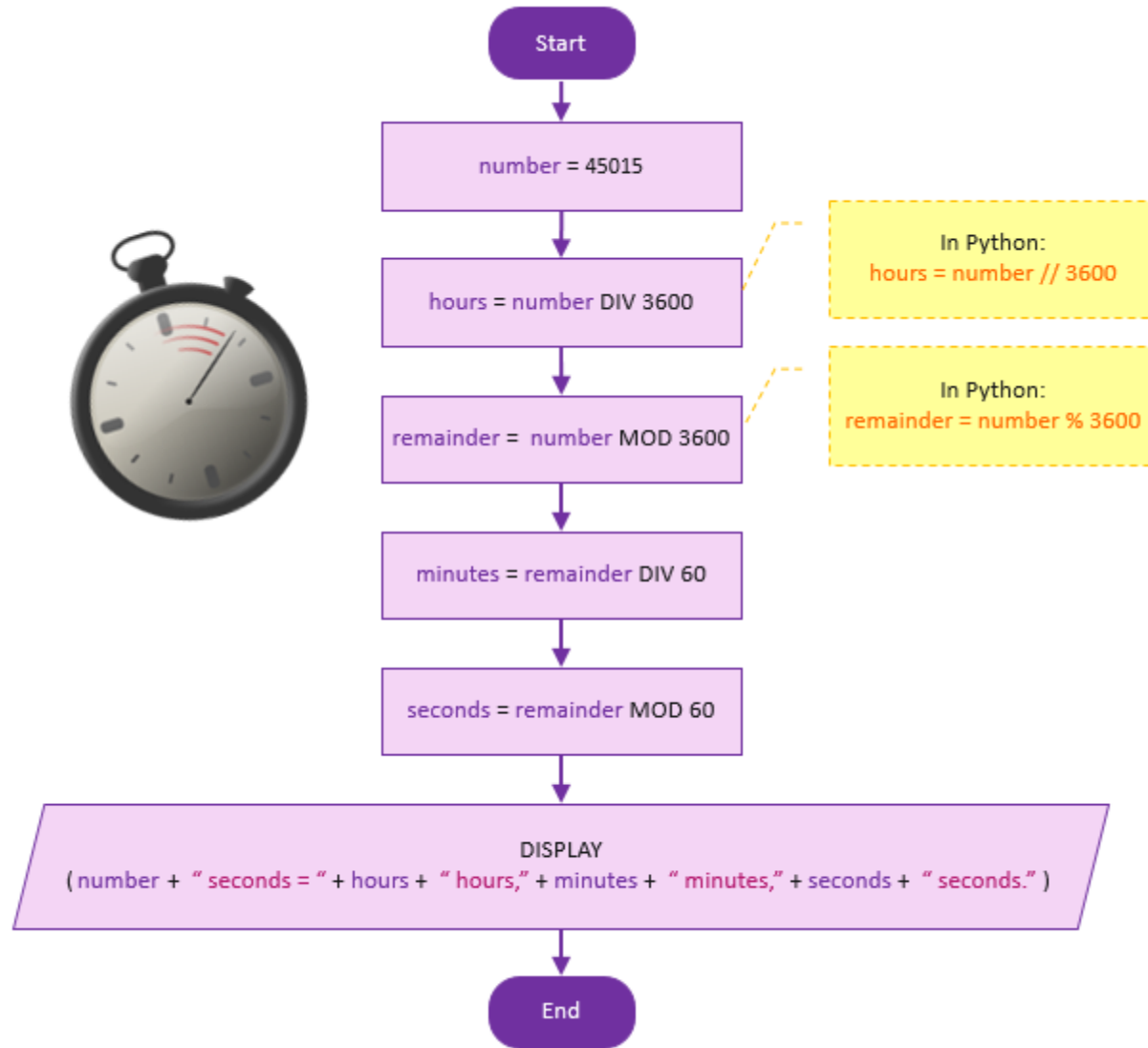


Sequential (Sequence)

- A **sequence** is a **series of actions** that is completed in a **specific order**. Action 1 is performed, then Action 2, then Action 3, etc., until all of the actions in the sequence have been carried out.
- A sequence we do every day is a **morning routine**. You might wake up, drink some water, take a shower, eat breakfast, and so on. Everyone's routine is different, but they're all made up of a **sequence of various actions**.

Sequence



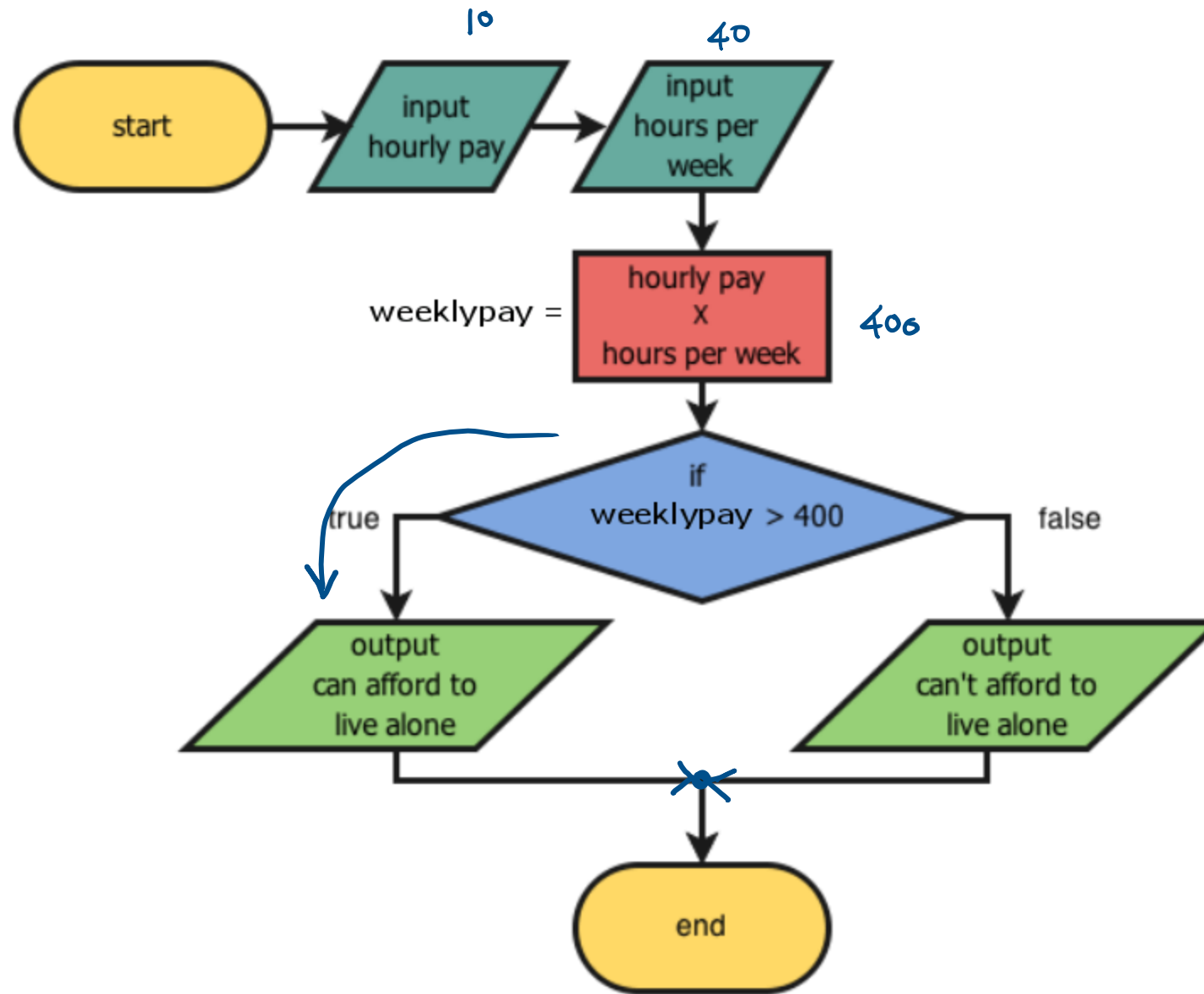


Selection

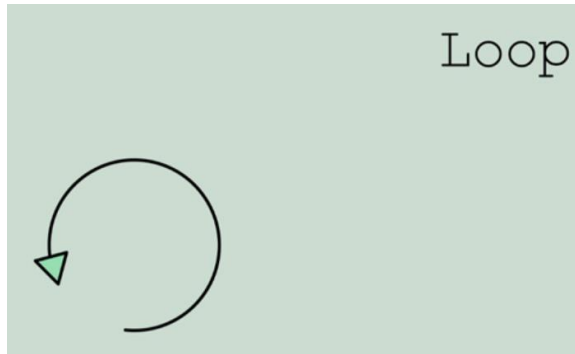


Conditional (Selection)

- **Selections** are a bit different. Instead of following a specific order of events, they **ask a question** in order to figure out **which path to take next**.
- Let's say you go to brush your teeth, and you find that you're out of toothpaste. You'd then ask, "Do I have any more toothpaste?" If the answer is **no**, then you would **add it to your shopping list**. But if the answer is **yes**, you would just **use the toothpaste**. This is really all a selection is doing: **answering a question based on what it finds**.

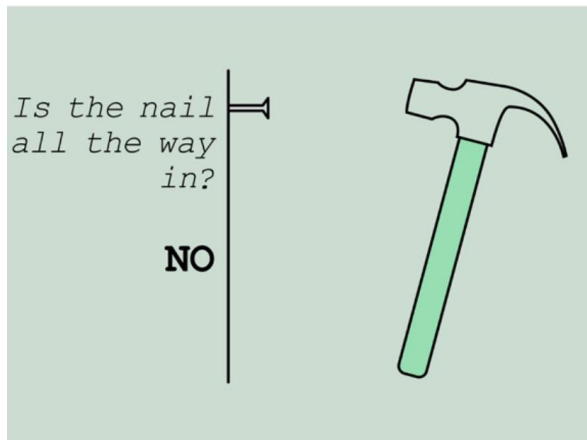


```
HourlyPay = int(input('Enter your hourly wages: '))
WorkingHours = int(input('How many hours per week: '))
WeeklyPay = HourlyPay * WorkingHours
if WeeklyPay < 400:
    print('I cannot afford to live alone.')
elif 400 <= WeeklyPay < 1000:
    print('I can afford to live alone in a small apartment.')
else:
    print('I can afford to live alone in a luxury apartment.')
```

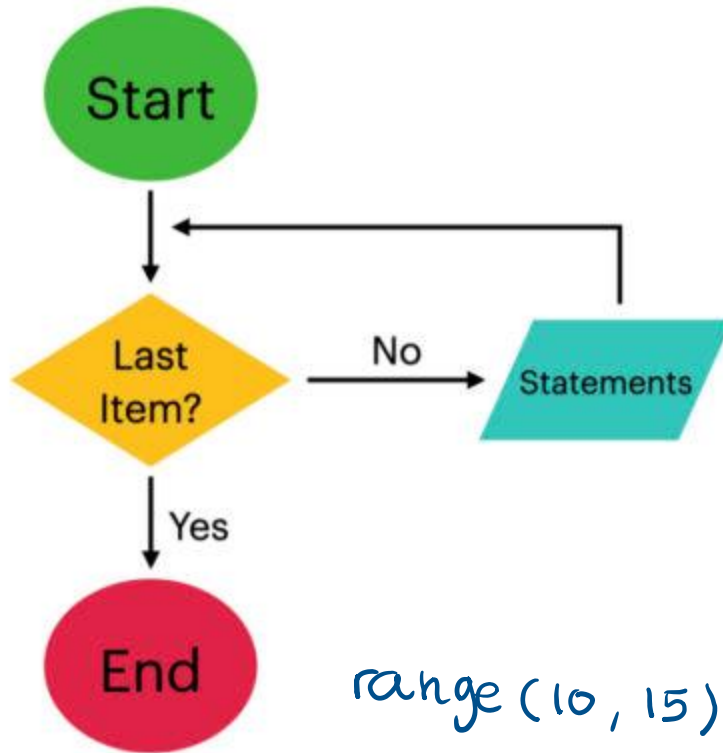



Loop

- The third programming structure is a **loop**. Like selections, loops ask questions. However, the difference is that they **ask the same question** over and over and over again, until a **certain task is complete**.
- For example, take the act of hammering a nail. Even though you may not realize it, you're constantly asking yourself, "Is the nail all the way in?" When the answer is **no**, you **hammer the nail again**. You continue to repeat this question until the answer is **yes**, and then you **stop**.

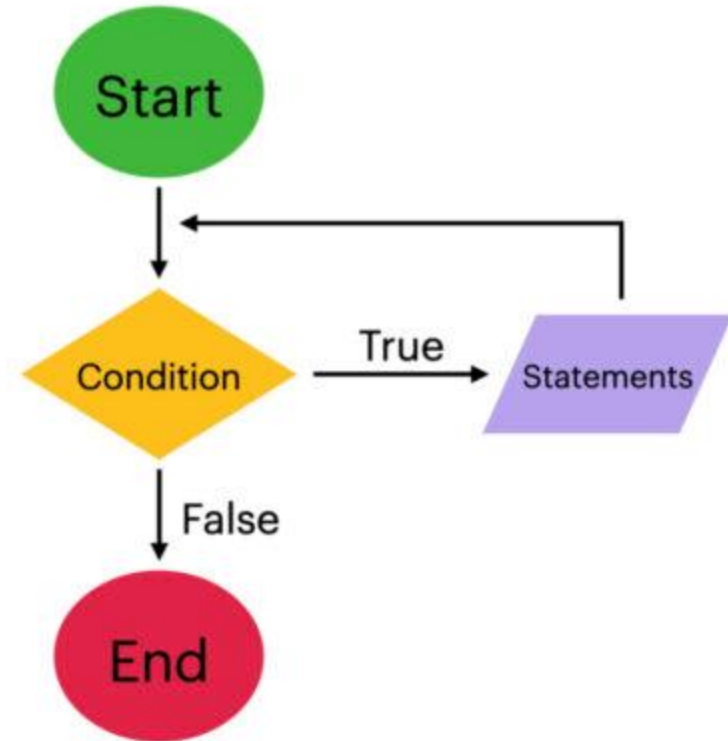


For Loop



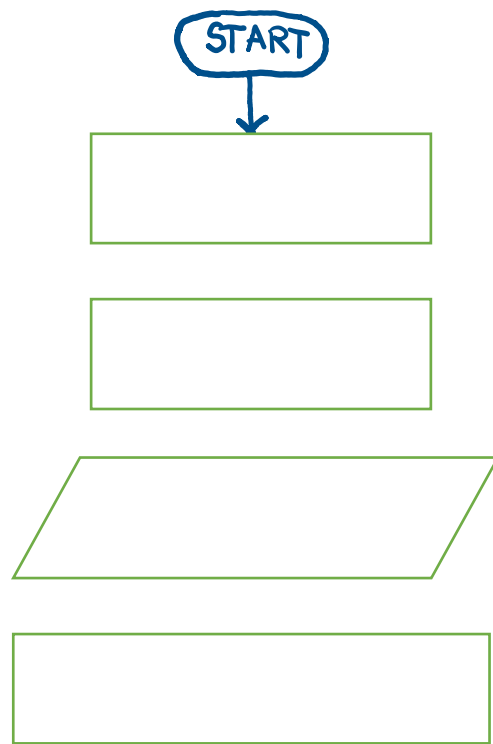
10
11
12
13
14

While Loop



Exercise (15 mins)

- Write a flowchart to illustrate a customer payment process flow. There is one condition regarding payment. If the bill is greater than 200 USD, you will pay using credit card. Otherwise, you will pay by cash.
- Imagine what steps you need when you want to pay a bill at the restaurant.



```
name = 'Harry'
surname = 'Potter'
YearofBirth = int(input('Enter your year of birth: '))
yourAge = 2021 - YearofBirth + 1
if yourAge < 20:
    print(name, surname)
    print('You are not allowed to buy alcohol.')
else:
    print(name, surname)
    print('You are ok to buy and drink alcohol.')
print('End of the code.')
```

Numbering System

- The number system or the numeral system is the system of naming or representing numbers. There are various types of number systems in maths like binary, decimal, etc.

Base 10

- Decimal Number System (Base 10 Number System)
- Decimal number system has base 10 because it uses ten digits from 0 to 9. In the decimal number system, the positions successive to the left of the decimal point represent units, tens, hundreds, thousands and so on. This system is expressed in [decimal numbers](#).
- Every position shows a particular power of the base (10). For example, the decimal number 1457 consists of the digit 7 in the units position, 5 in the tens place, 4 in the hundreds position, and 1 in the thousands place whose value can be written as
 - $(1 \times 10^3) + (4 \times 10^2) + (5 \times 10^1) + (7 \times 10^0)$
 - $(1 \times 1000) + (4 \times 100) + (5 \times 10) + (7 \times 1)$
 - $1000 + 400 + 50 + 7$
 - 1457

Base 2

- The base 2 number system is also known as the [Binary number system](#) wherein, only two binary digits exist, i.e., 0 and 1. The figures described under this system are known as binary numbers which are the combination of 0 and 1. For example, 110101 is a binary number.

Base 16

- In the hexadecimal system, numbers are written or represented with base 16. In the hex system, the numbers are first represented just like in decimal system, i.e. from 0 to 9. Then, the numbers are represented using the alphabets from A to F. The below-given table shows the representation of numbers in the [hexadecimal number system](#).

Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Decimal	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15