Exercise walk-through

6.1
Data types, strings, exceptions and trace tables

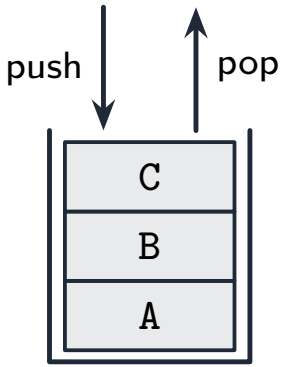
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Catching bad input with try and except

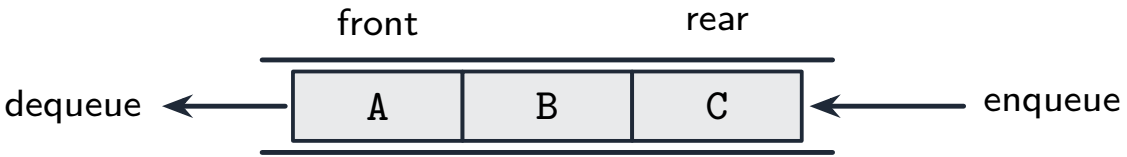
- An unhandled **exception** stops the program.
- The loop repeats until the cast succeeds.

```
while True:
    text = input("Quantity: ")
    try:
        qty = int(text)
        break
    except ValueError:
        print("Enter a whole number.")
```

Stacks and queues



stack: last in, first out



queue: first in, first out

> Stack: push and pop at the top (undo, back button). Queue: enqueue at the rear, dequeue at the front (print jobs).

Check yourself

Your turn

Exam habits to check before you answer.

A. Does your trace table give a new row each time a variable changes?

B. Did you state that Python indexes from 0?

C. Did you name a stack or queue's order, its two operations and a real use?

D. Did you open files with with and handle bad input with try and except?

E. Did you say the list must be sorted, and give low, high and mid at every probe?

Exercises 2.1·2.2

2.1 State the most suitable data type for: (i) the number of seats in a cinema; (ii) the price of a ticket, 8.50; (iii) whether a seat is booked; (iv) a booking reference such as `"K7-204"`. [4]

2.2 Evaluate: (i) `17 // 5`; (ii) `17 % 5`; (iii) `17 / 5`. [3]

Exercises 2.1·2.2

2.1 State the most suitable data type for: (i) the number of seats in a cinema; (ii) the price of a ticket, 8.50; (iii) whether a seat is booked; (iv) a booking reference such as `"K7-204"`. [4]

2.1

- (i) **integer**
- (ii) **real** (float)
- (iii) **Boolean**
- (iv) **string**: it holds letters and a hyphen

2.2 Evaluate: (i) `17 // 5`; (ii) `17 % 5`; (iii) `17 / 5`. [3]

2.2

- (i) **3**
- (ii) **2**
- (iii) **3.4**

Exercises 2.3·2.4

2.3 `code = "IB2027CS"`. State: (i) `len(code)`; (ii) `code[2:6]`; (iii) `code.find("C")`; (iv) `code[-1]`. [4]

2.4 Classify each error as syntax, runtime or logic. [3]

(i) `print("Total:", total` with no closing bracket

(ii) an average calculated as `total / 10` when there are 12 items

(iii) `marks[5]` when `marks` has 5 items

Exercises 2.3·2.4

2.3 `code = "IB2027CS"`. State: (i) `len(code)`; (ii) `code[2:6]`; (iii) `code.find("C")`; (iv) `code[-1]`. [4]

2.3

- (i) **8**
- (ii) indexes 2 to 5: `"2027"`
- (iii) **6**
- (iv) the last character, `"S"`

2.4 Classify each error as syntax, runtime or logic. [3]

(i) `print("Total:", total` with no closing bracket

(ii) an average calculated as `total / 10` when there are 12 items

(iii) `marks[5]` when `marks` has 5 items

2.4

- (i) **syntax**
- (ii) **logic**: it runs but gives the wrong answer
- (iii) **runtime**: an index error, as valid indexes are 0 to 4

Exercises 3.1·3.2

3.1 What is printed by `print("3" + "4")`? [1]

- ☐ **A** `7`
- ☐ **B** `34`
- ☐ **C** `"3" + "4"`
- ☐ **D** an error message

3.2 `word = "python"`. Which expression gives `"tho"`? [1]

- ☐ **A** `word[2:4]`
- ☐ **B** `word[2:5]`
- ☐ **C** `word[3:5]`
- ☐ **D** `word[3:6]`

Exercises 3.1·3.2

3.1 What is printed by `print("3" + "4")`? [1]

- ☐ **A** `7`
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- ☐ **C** `"3" + "4"`
- ☐ **D** an error message

3.1 B

- `+` joins two strings

3.2 `word = "python"`. Which expression gives `"tho"`? [1]

- ☐ **A** `word[2:4]`
- ☐ **B** `word[2:5]`
- ☐ **C** `word[3:5]`
- ☐ **D** `word[3:6]`

3.2 B

- indexes 2, 3, 4: `t`, `h`, `o`

Exercise 3.3

3.3 Which input makes `int(input())` raise a `ValueError`? [1]

- ☐ **A** `42`
- ☐ **B** `-7`
- ☐ **C** `007`
- ☐ **D** `4.5`

Exercise 3.3

3.3 Which input makes `int(input())` raise a `ValueError`? [1]

- ☐ **A** `42`
- **B** `-7`
- **C** `007`
- **D** `4.5`

3.3 D

- `int` cannot convert text with a decimal point

Setup for exercise 3.4

3.4 A program reads temperatures until the user enters `x`.

```
count = 0
total = 0
high = -100
t = input()
while t != "x":
    v = int(t)
    count = count + 1
    total = total + v
    if v > high:
        high = v
    t = input()
print(total / count, high)
```

Exercise 3.4 (a)

(a) Complete a trace table for the inputs `18`, `23`, `19`, `x`, with columns `t`, `count`, `total` and `high`, and state the output. [4]

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(a)

`t`	`count`	`total`	`high`
`"18"`	0	0	-100
	1	18	18
`"23"`	2	41	23
`"19"`	3	60	23
`"x"`			

- `count` and `total` correct
- `high` correct
- loop ends at `x`
- output **20.0 23**

Exercise 3.4 (b)

(b) State the output if the first input is `x`, and explain why. [2]

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(b)

- the loop body never runs, so `count` is 0
- `total / count` divides by zero: a **`ZeroDivisionError`**, and nothing is printed

Exercise 3.4 (c)

(c) Explain why the program crashes if the user types `twenty`, and describe how `try … except` would prevent it. [3]

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(c)

- `int("twenty")` raises a `ValueError`
- put the cast inside `try`
- the `except ValueError` block prints a message and asks again instead of stopping

Exercise 3.4 (d)

(d) Give **three** test inputs for the temperature, one normal, one boundary and one invalid, for a sensor that reads from -40 to 50. [3]

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(d)

- normal: e.g. 21
- boundary: -40 or 50
- invalid: e.g. 51, -41 or `"abc"`