

CSE 30 4-29-21

1

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Pa4 : Continued Fractions, Py

- split() in string type.
- map() : built-in fun.
- decimal module

- Abstract Data Types (ADTs)
- Data Structures

An ADT consists of

- a set of states
- a set of operations on states
  - access functions  
return something, don't change state.
  - manipulation procedures  
alter the state an instance of the ADT

A Data Structure is a construct in a computer language that represents some area of memory.

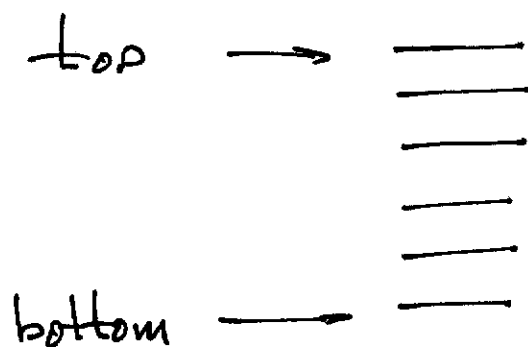
Python examples: list, dict, tuple,  
int, string, set,  
.....

we use data structures to  
build ADTs.

Ex. Stack ADT.

stacks: finite sequences

all insertions and deletions take place  
at same end of seq., called the top.



last in first out  
LIFO

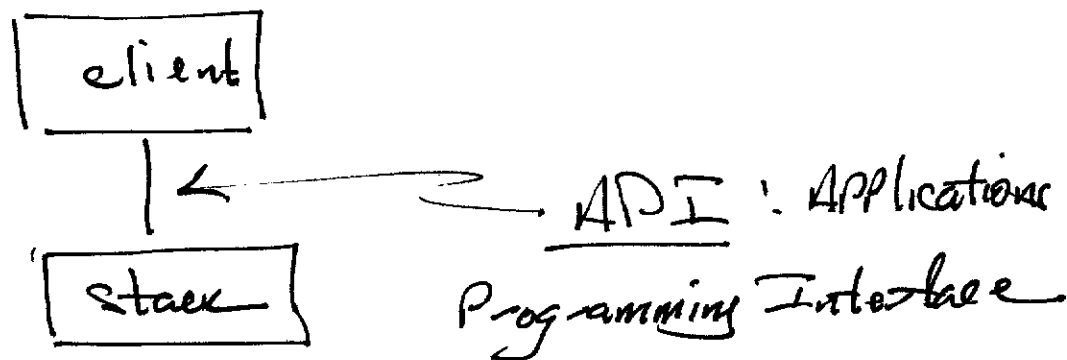
## Operations:

Push(x): Adds item x to top

Pop(): deletes and returns top item  
(raise IndexError if empty)

Peek(): return top item  
(raise IndexError if empty)

isEmpty(): return True if the stack is empty state



data hiding: client cannot access internal details of API except through the interface.

repr string should satisfy:

$$\text{eval}(\text{repr}(x)) = x$$

Ex. stack implementation:

[ • , • , • , • ]

↑

bottom

↑

top

stack

list

$$\text{push}(x) = \text{append}(x)$$

$$\text{pop}() = \text{pop}()$$

valid indices for list type

$$-n \leq i \leq n-1$$

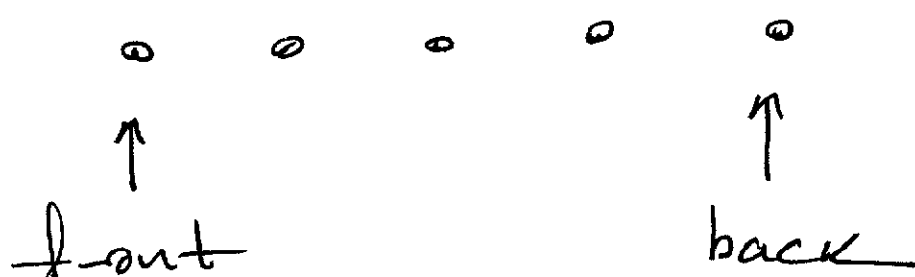
where  $n = \text{len of list}$ .

## Ex Queue ADT

16

states: finite sequences

all insertions take place at one end, called back. all deletions are at other end, called front



first in, first out: FIFO.

operations:

enqueue( $x$ ): adds  $x$  to back

dequeue(): deletes and returns front (↑)

peek(): return front item (if not empty)

isEmpty(): returns true if empty

Ex. List ADT

states: finite sequences

next time:

what is inside Python's list  
data type?

new data structure:

linked-list