Fondamenti di Tecnologia e Cultura Digitale

Lezione 4

Mario Verdicchio

Università degli Studi di Bergamo

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Hardware




x y r g b
(9,14,245,133,167)

3,217) (8,87,245,133,167) (9,03,245,133,167) (9,18,245,13
3,152) (8,88,245,200,211) (9,04,245,133,167) (9,19,245,13
3,007) (8,89,245,150,167) (9,05,245,133,180) (9,20,245,13
3,098) (8,90,245,133,167) (9,06,245,133,167) (9,21,245,17
3,111) (8,91,245,133,167) (9,07,245,110,100) (9,22,215,13
3,167) (8,92,245,133,167) (9,08,245,133,200) (9,23,250,13
3,168) (8,93,245,099,001) (9,09,245,133,201) (9,24,245,13
3,122) (8,94,245,133,167) (9,10,251,133,167) (9,25,245,13
3,250) (8,95,245,133,167) (9,11,240,133,167) (9,26,245,13
3,077) (8,96,245,133,167) (9,12,245,133,088) (9,27,245,13
3,199) (8,97,245,133,167) (9,13,245,099,071) (9,28,245,13
3,023) (8,98,245,133,167) (9,14,245,133,167) (9,29,245,13
3,071) (8,99,245,133,167) (9,15,245,133,167) (9,30,245,13
3,185) (9,01,245,133,167) (9,16,245,099,121) (9,31,245,13
3,130) (9,02,245,133,167) (9,17,245,133,167) (9,32,245,13

Software



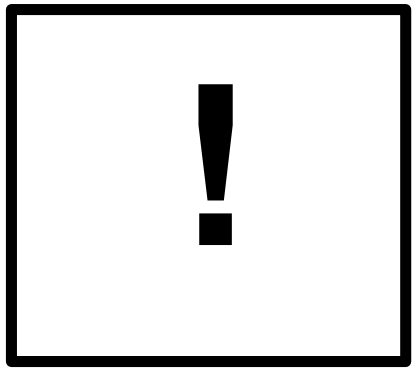






Problema

Un ostacolo, un impedimento, una mancanza che vogliamo eliminare.



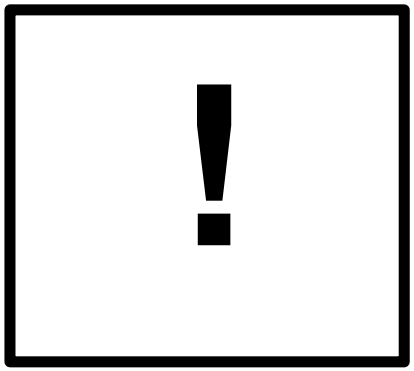
Soluzione

Eliminazione del problema.



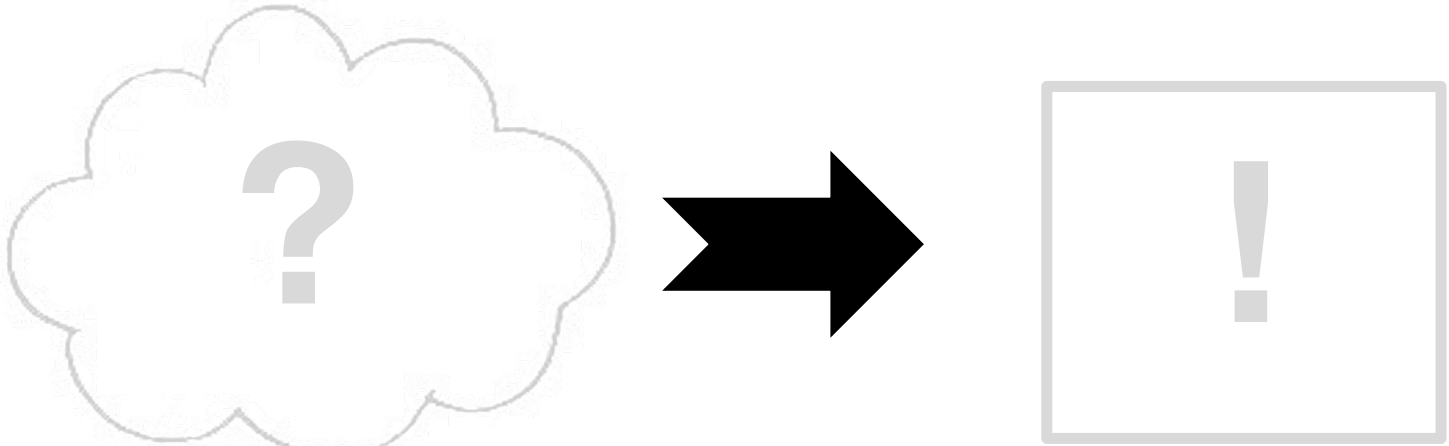
Computer







Un problema si dice risolvibile quando esiste una soluzione per esso.
Se vogliamo che sia il computer a trovare la soluzione, il problema deve essere espresso sotto forma di dati che il computer possa elaborare.

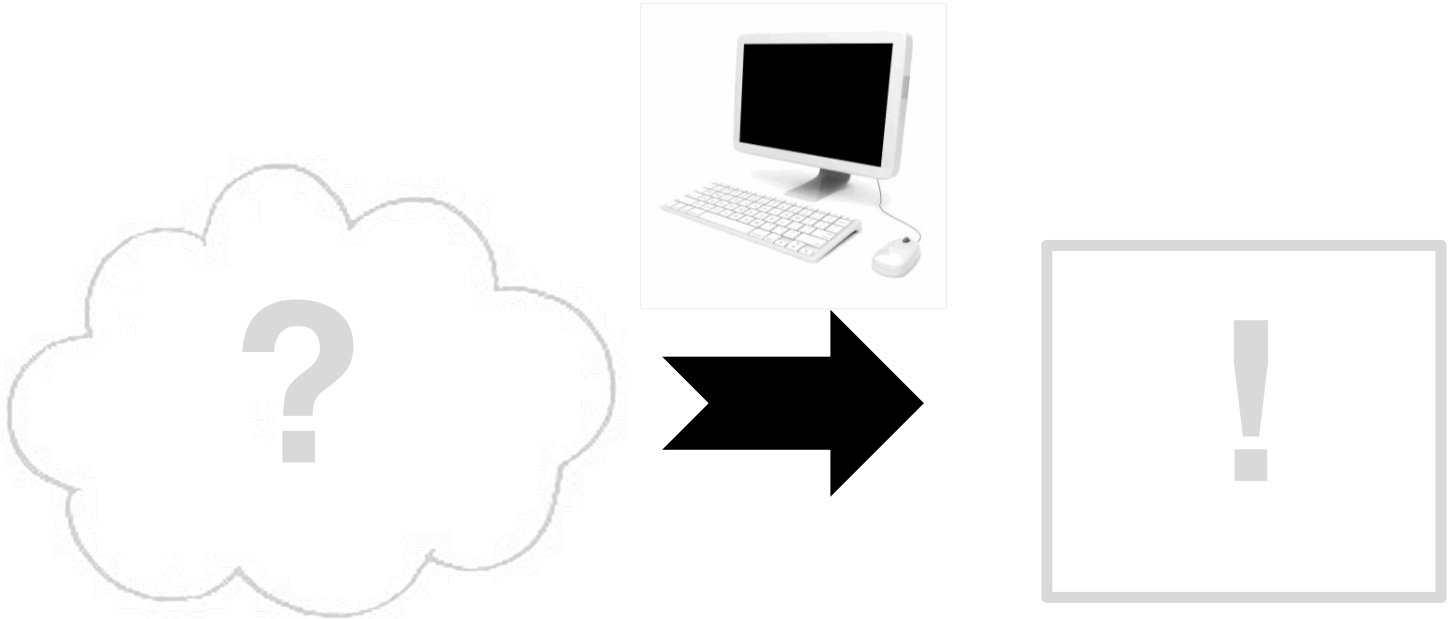


Algoritmo

Un metodo per giungere alla soluzione che presenta le seguenti caratteristiche:
1) è una sequenza finita di operazioni ben definite;
2) dopo l'esecuzione di ciascuna operazione, è chiaro quale sia la successiva.



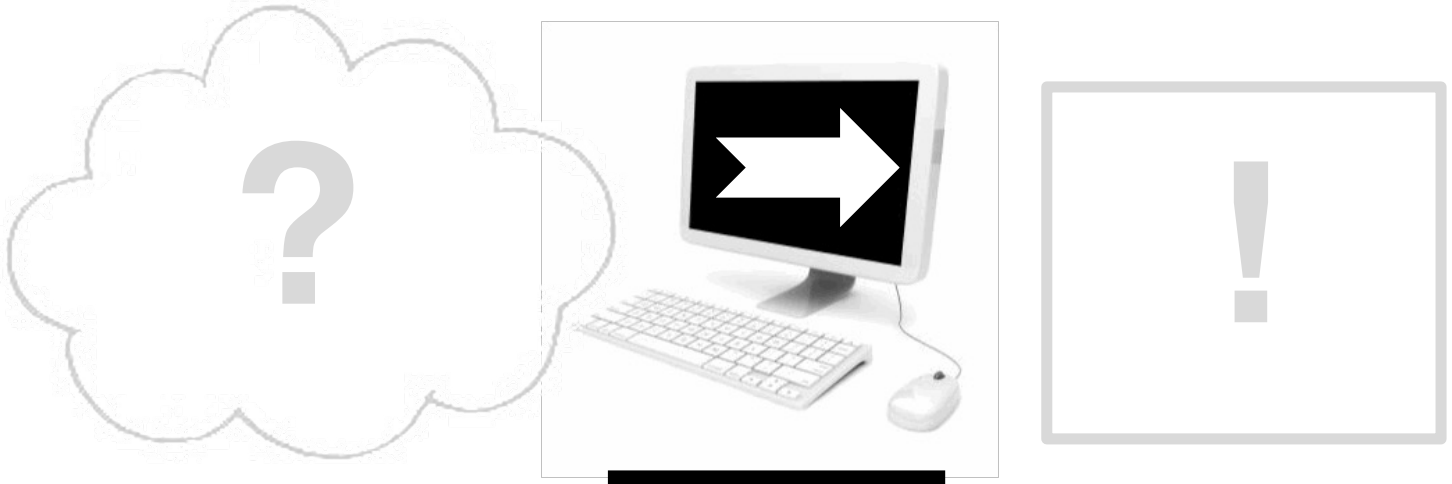
Muḥammad ibn Mūsā al-Khwārizmī
(780 – 850)



Programma

Un algoritmo scritto in modo tale da poter essere eseguito da un computer.

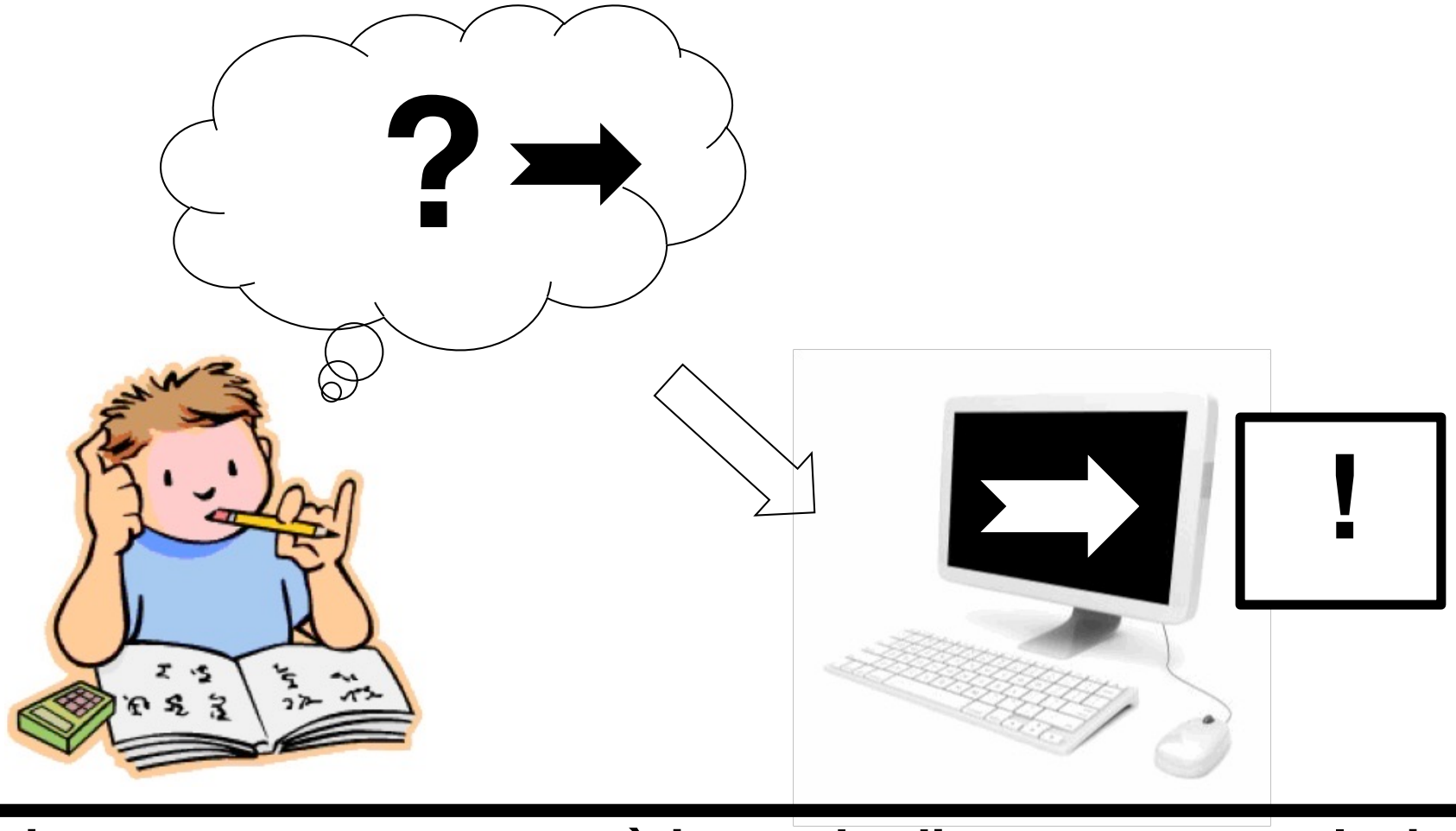
Tutte le operazioni consistono nell'elaborazione di dati numerici.



Processo

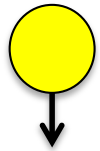
Un programma in esecuzione su un computer.

In linea di massima, i programmi risiedono solitamente sul disco rigido del computer, mentre i processi risiedono nella RAM.

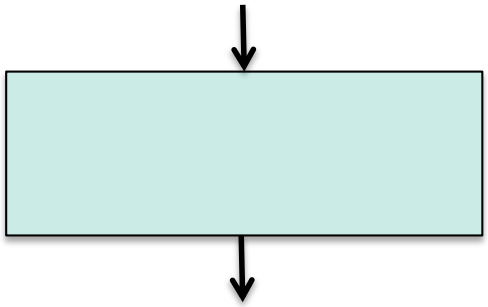


Attenzione: un computer non è in grado di trovare una soluzione autonomamente. L'algoritmo deve prima essere ideato e successivamente trasferito nel computer sotto forma di programma, affinché venga eseguito e fornisca una soluzione.

Diagrammi di flusso

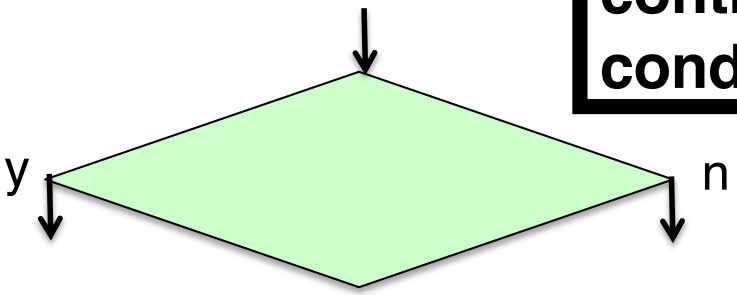


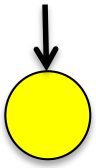
inizio



operazione

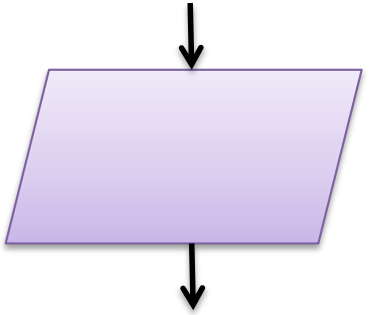
controllo di condizione

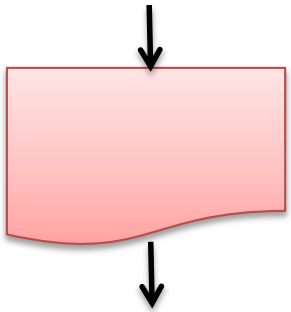




fine

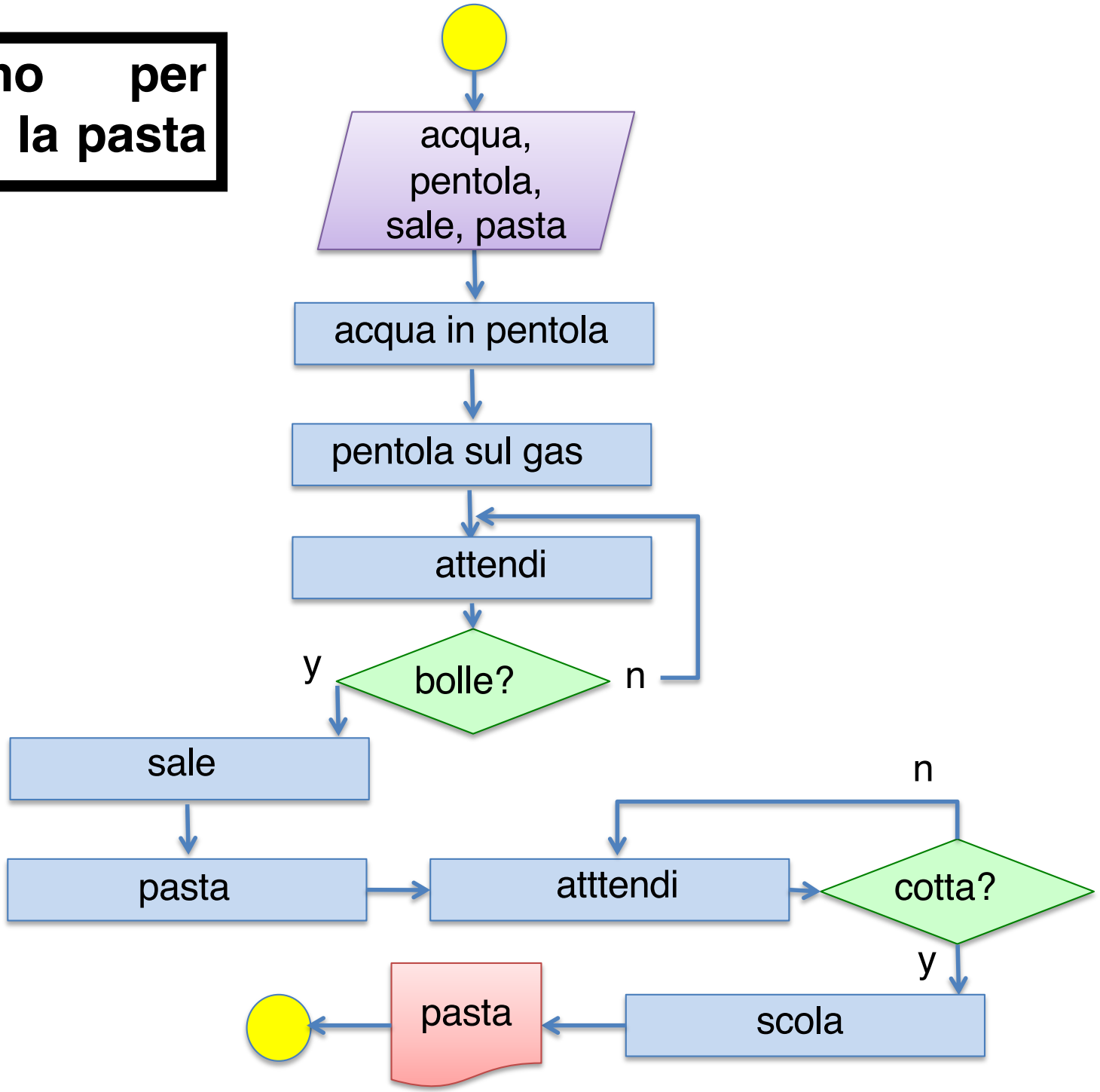
input





output

Algoritmo per cuocere la pasta



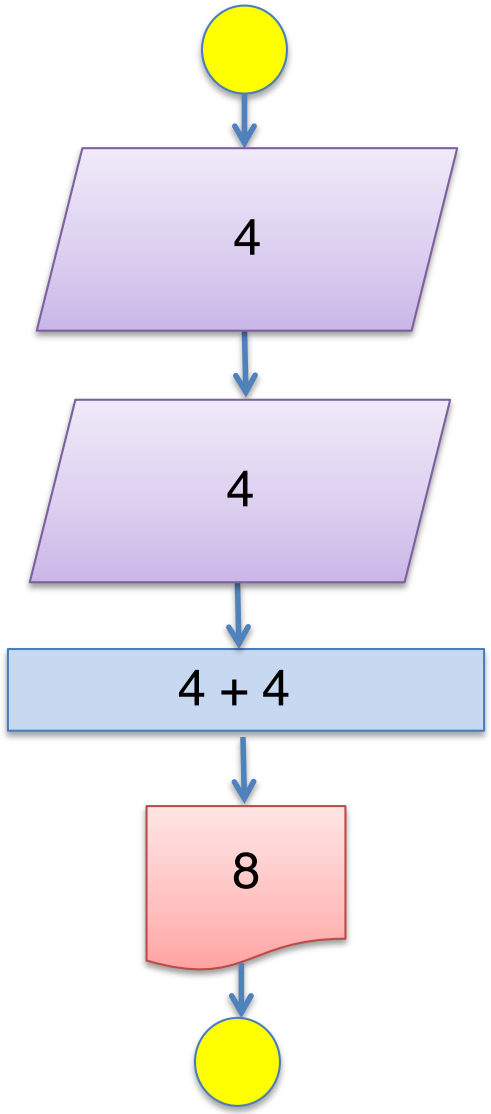
Algoritmo per esseri umani, non per computer, per vari motivi.



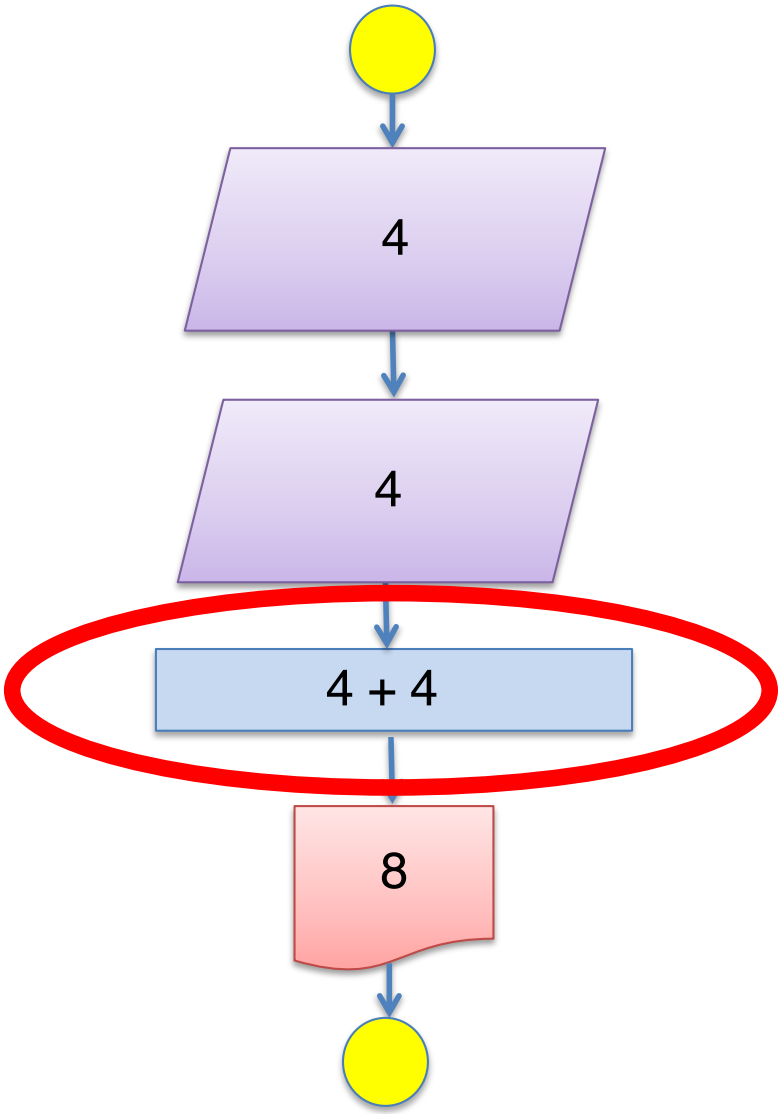


Un computer è un calcolatore: può solo ricevere dati numerici, elaborare dati numerici, e restituire dati numerici.

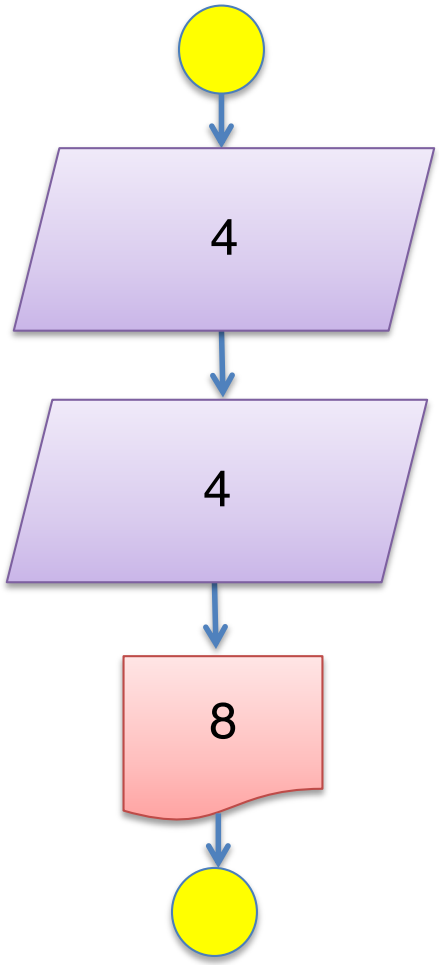
Algoritmo per fare 4 + 4.


4
4
4 + 4
8



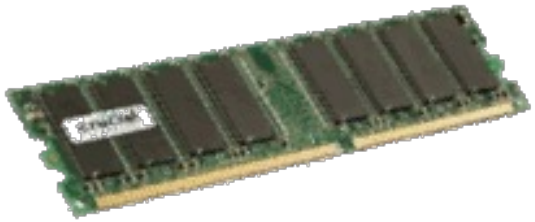

4
4
4 + 4
8




4
4
8



Variabili

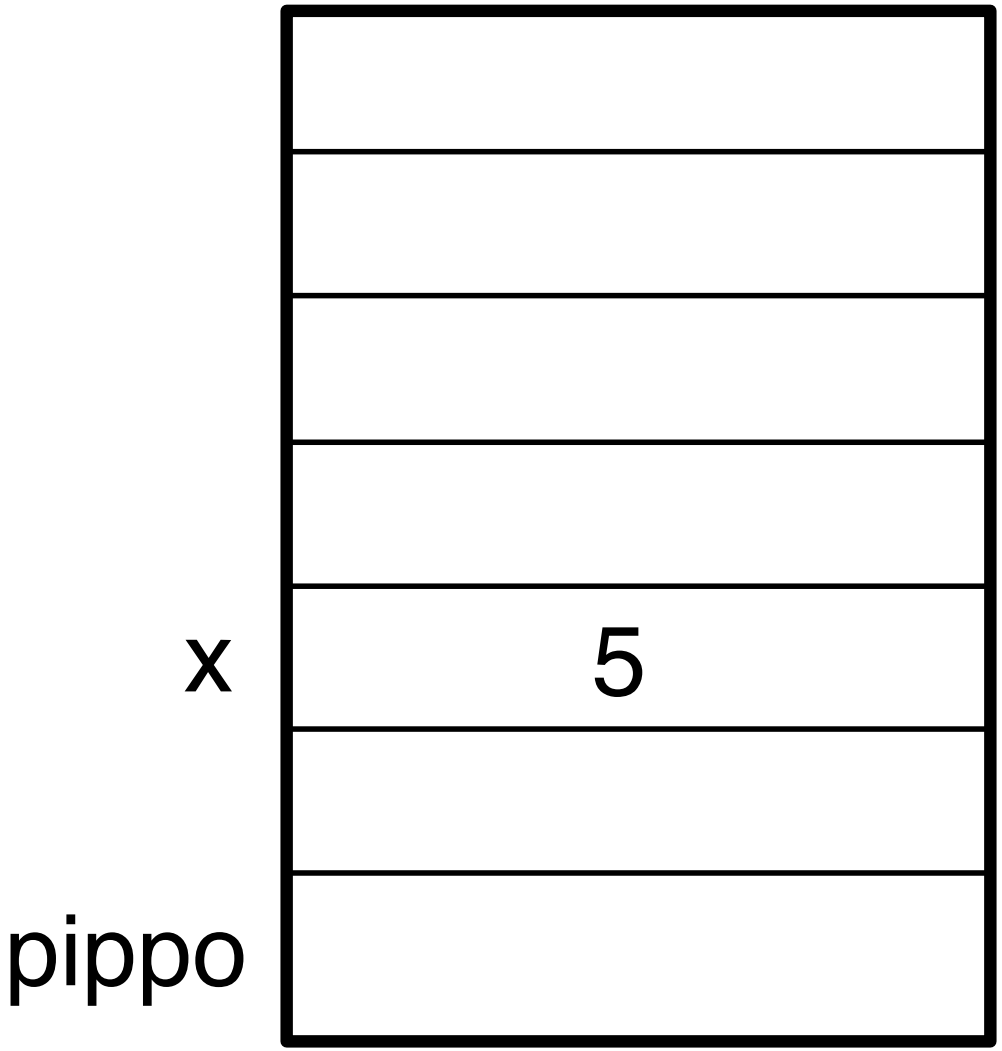


x

pippo

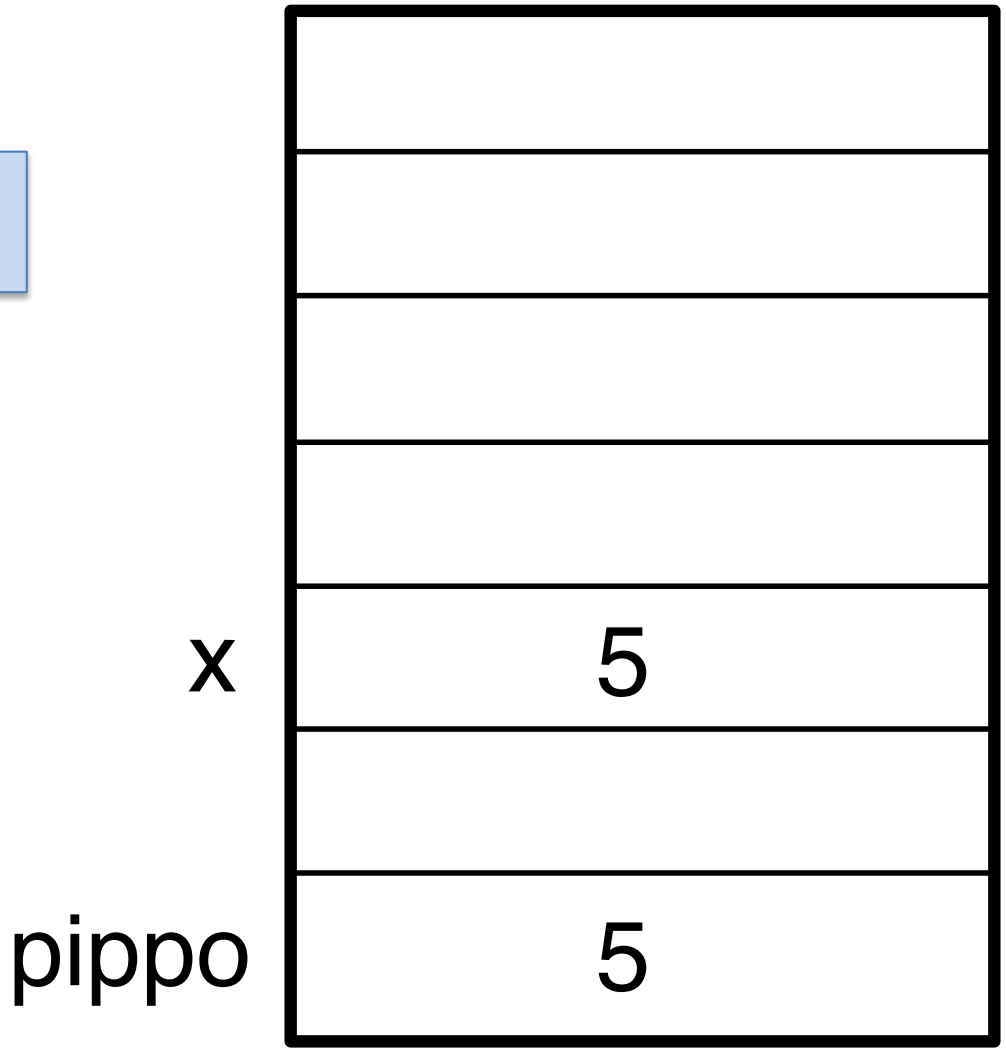
Assegnamenti

$x \leftarrow 5$



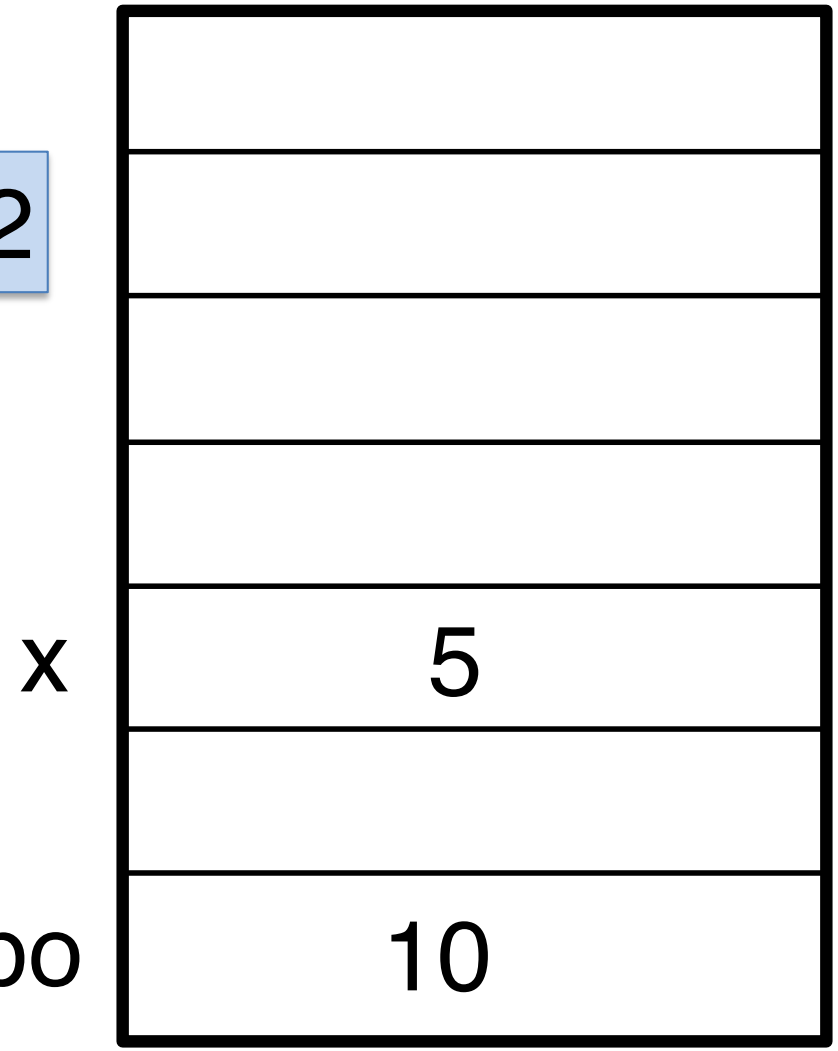
Assegnamenti

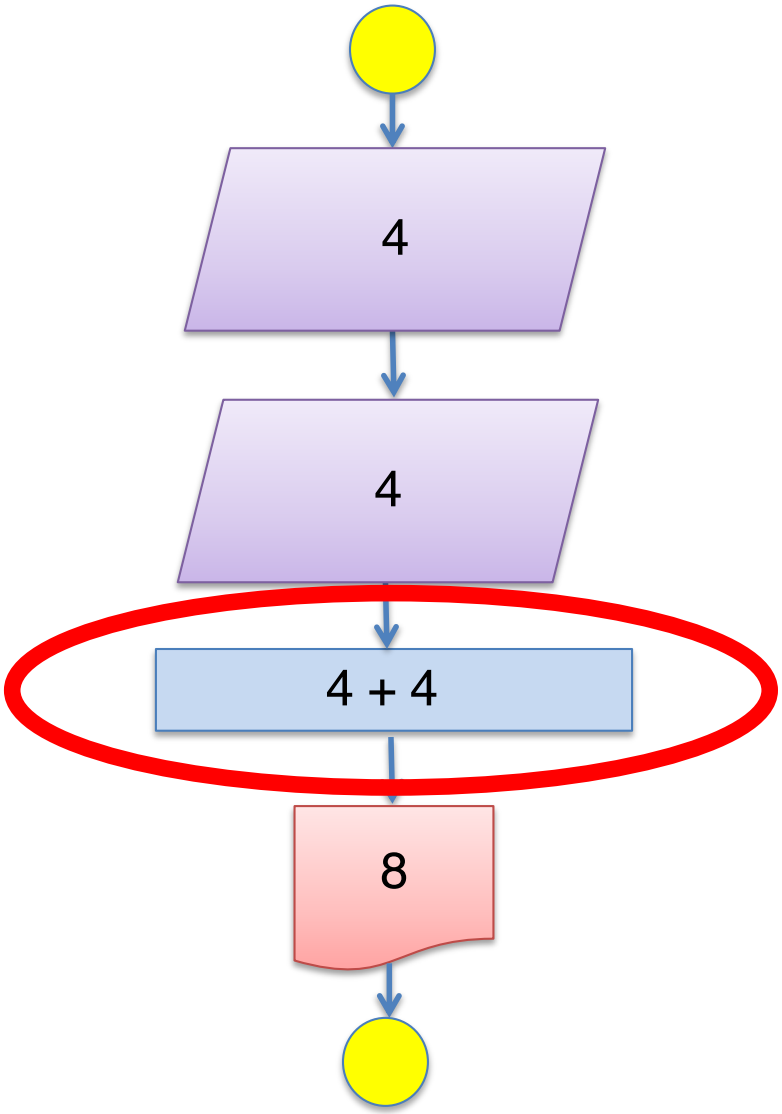
pippo ← x



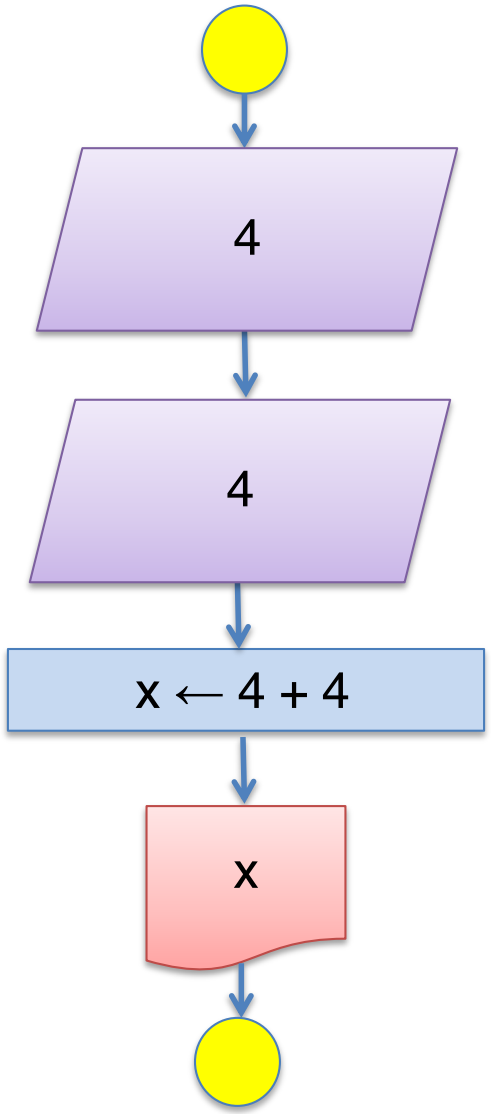
Assegnamenti

pippo ← pippo × 2

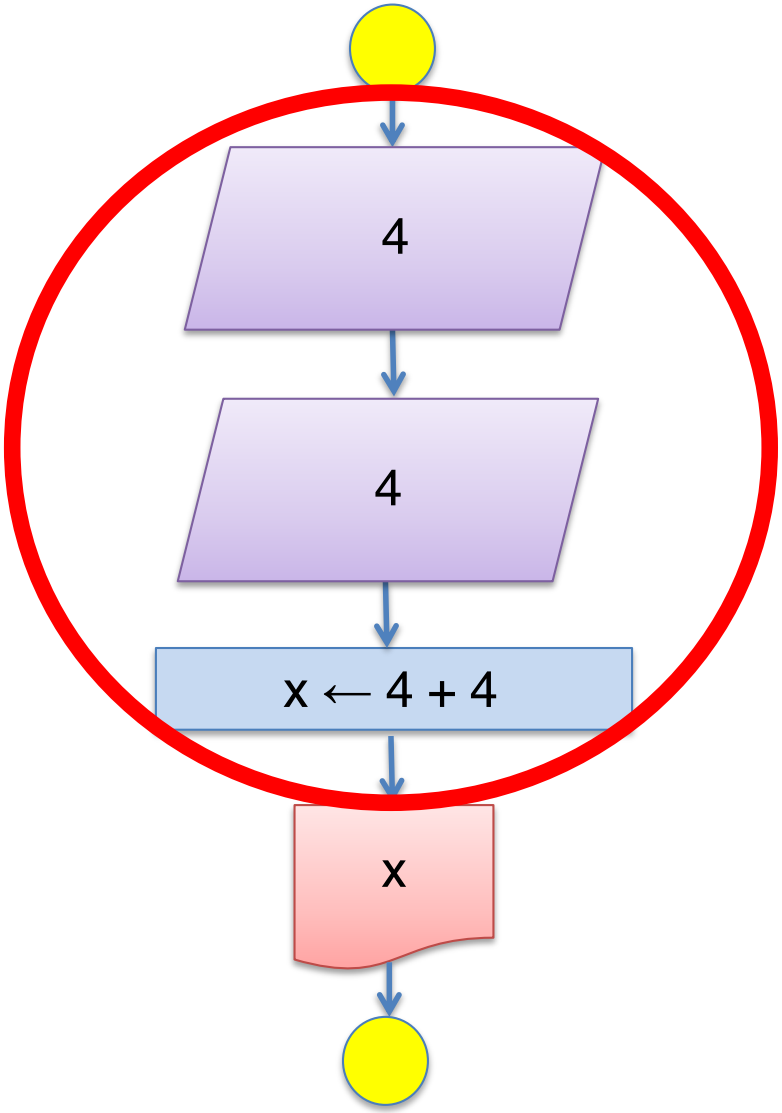



4
4
4 + 4
8

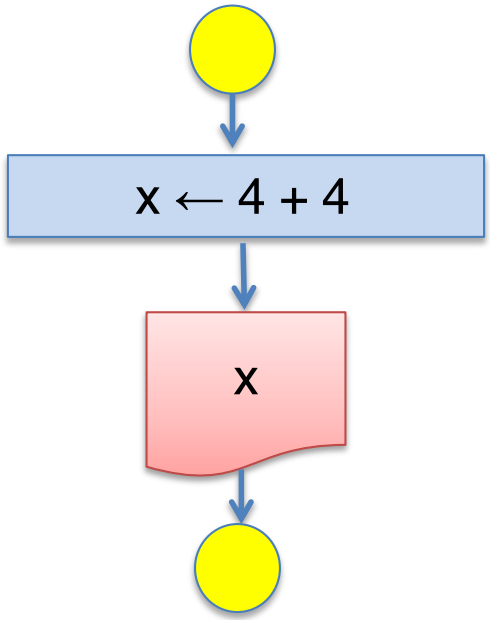



4
4
x ← 4 + 4
x

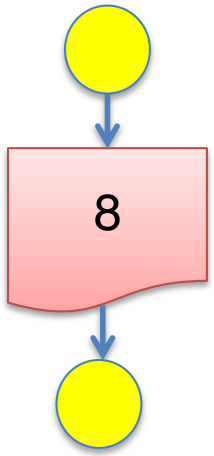



4
4
x ← 4 + 4
x



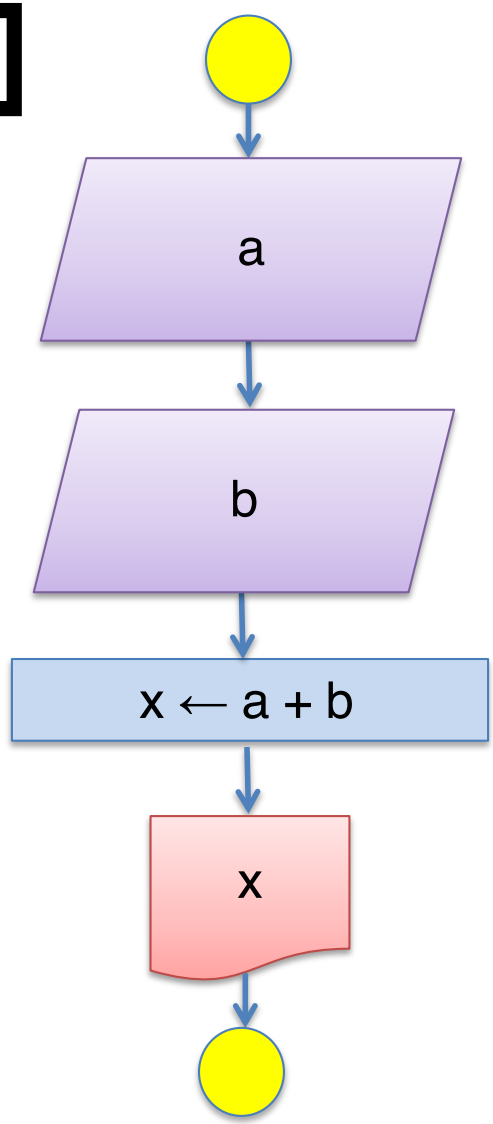

x ← 4 + 4
x



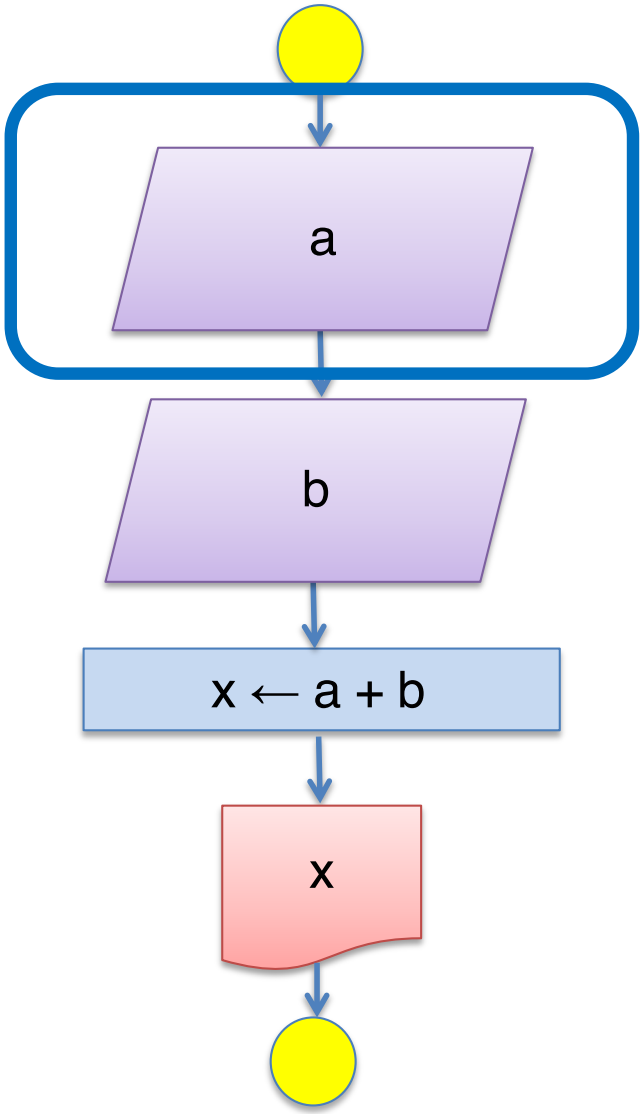

8

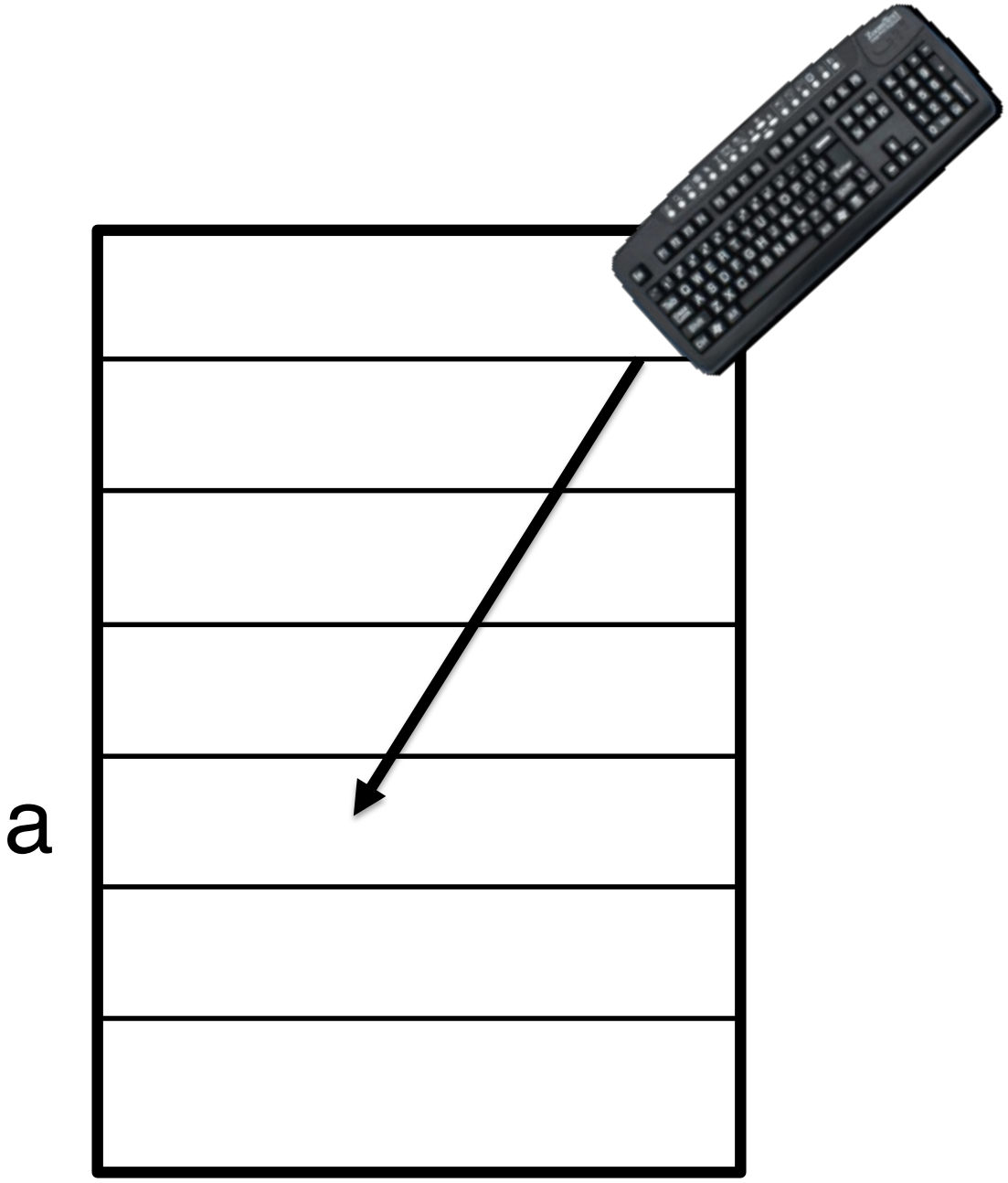


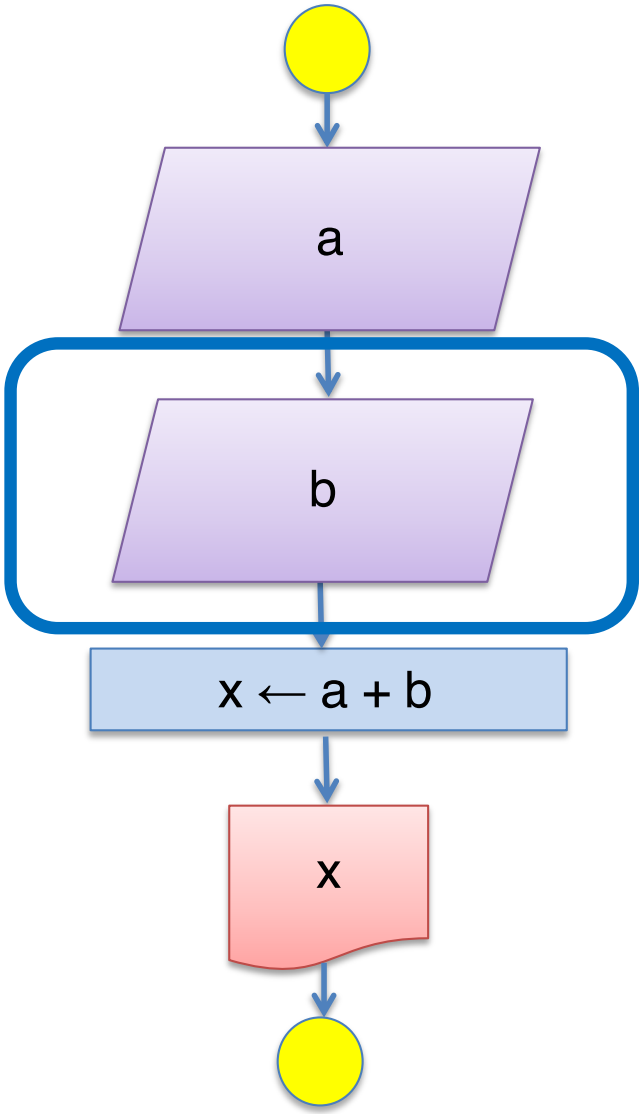
Parametrizzazione

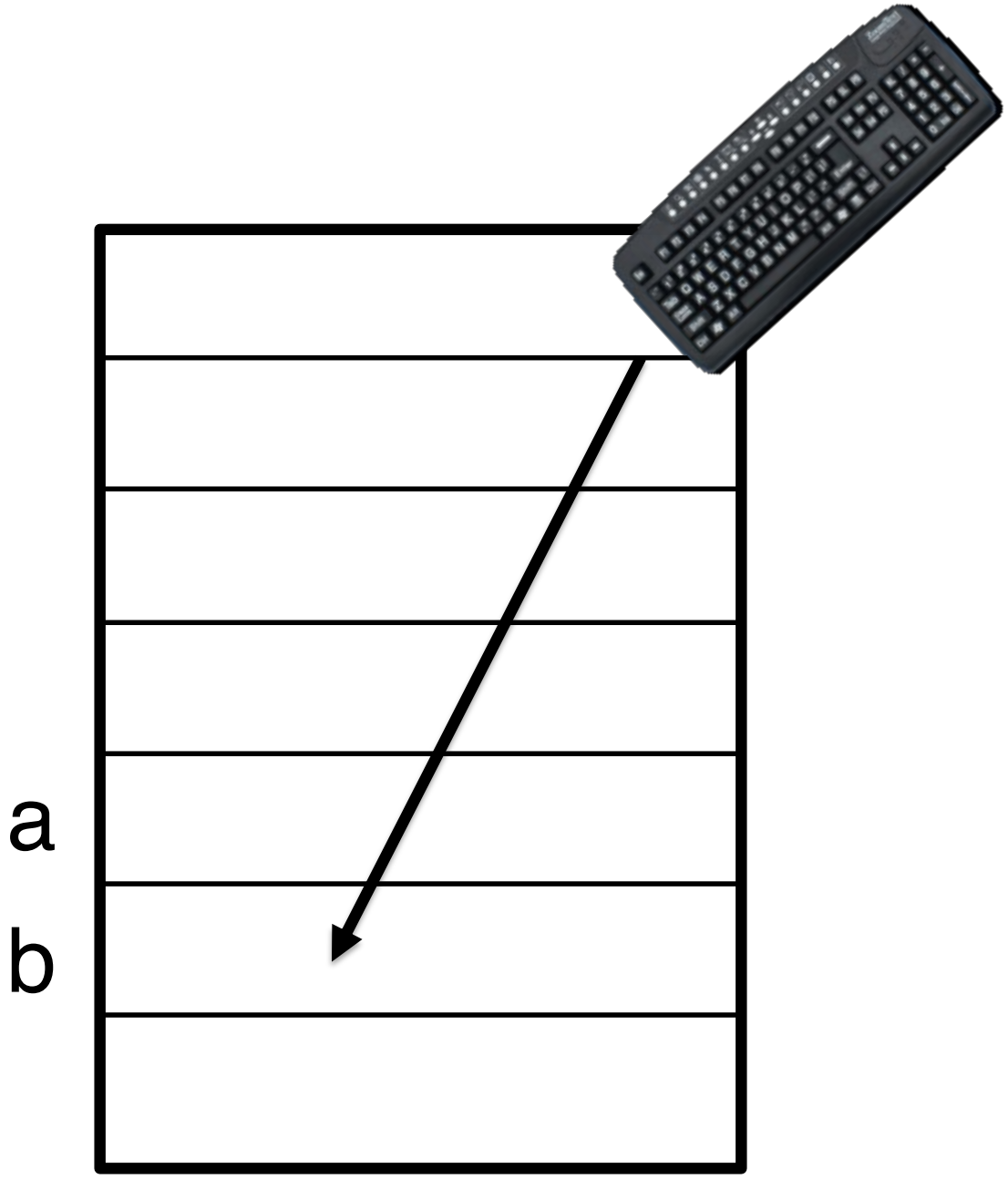


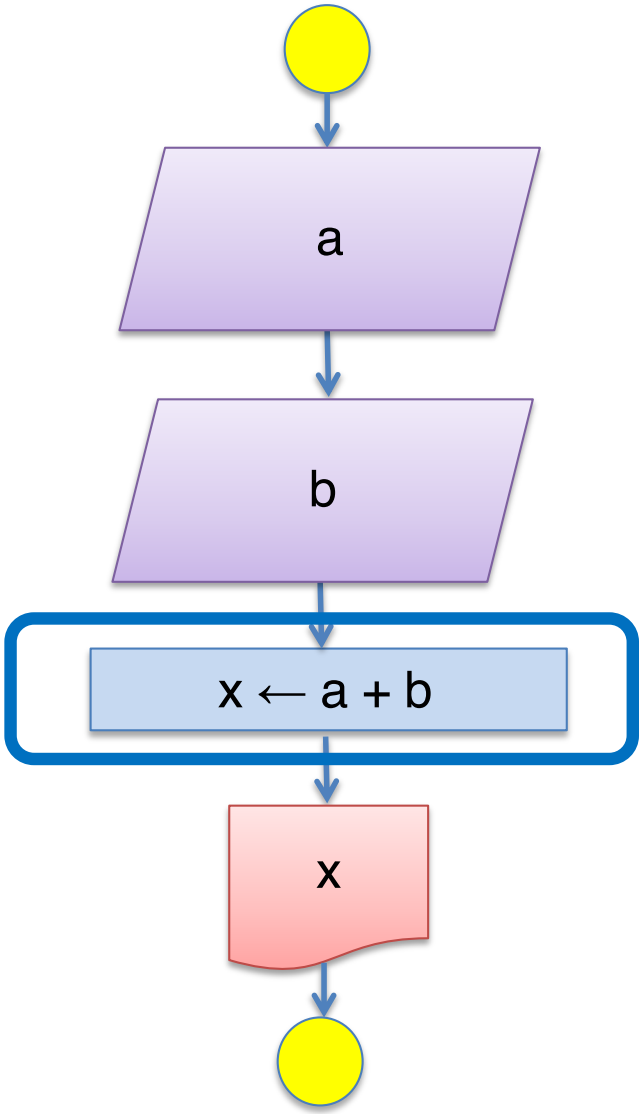


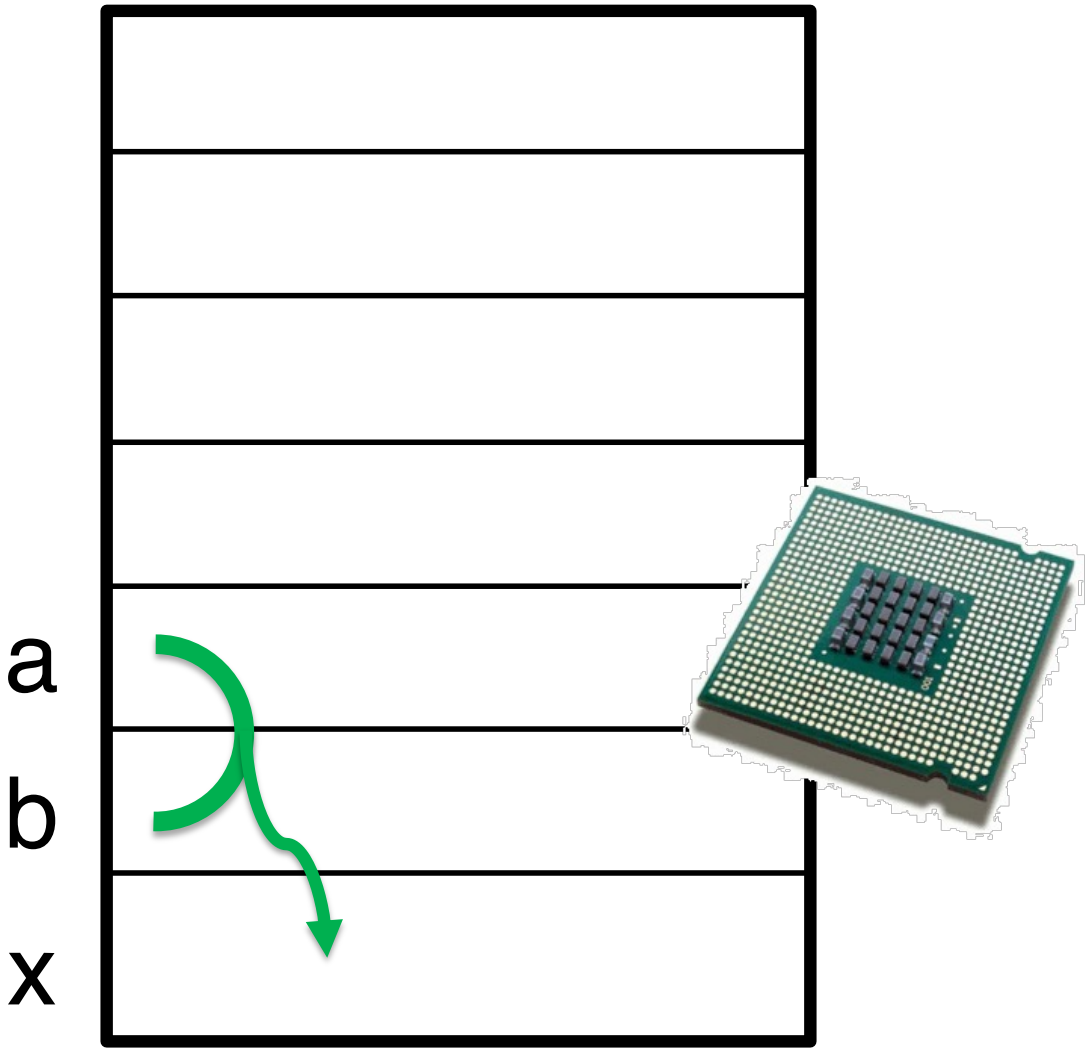

a
b
x ← a + b
x

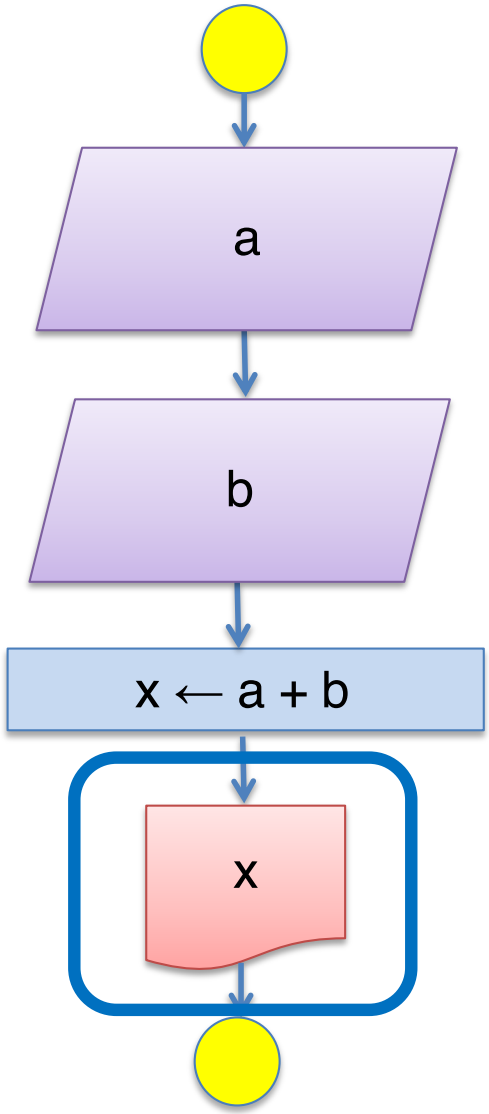

a

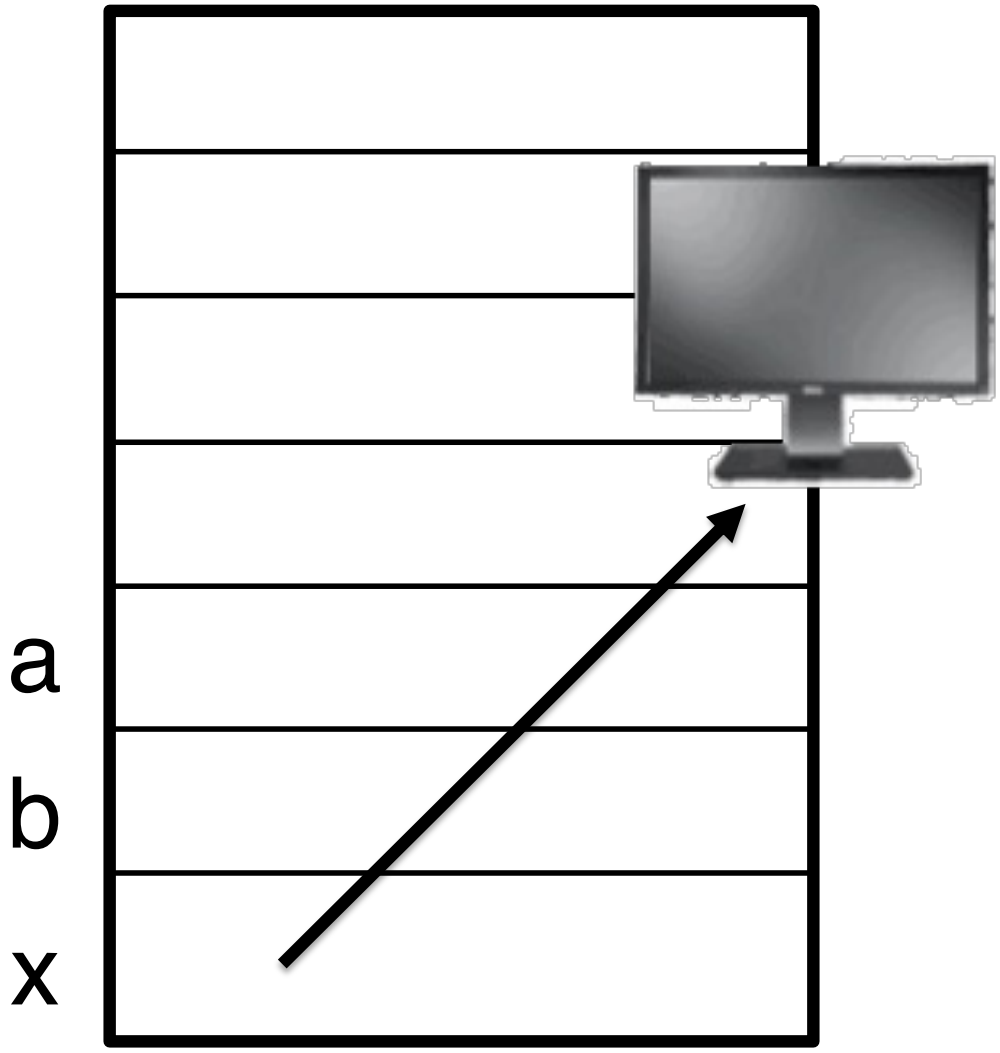

a
b
x ← a + b
x


a
b


a
b
x ← a + b
x


a
b
x

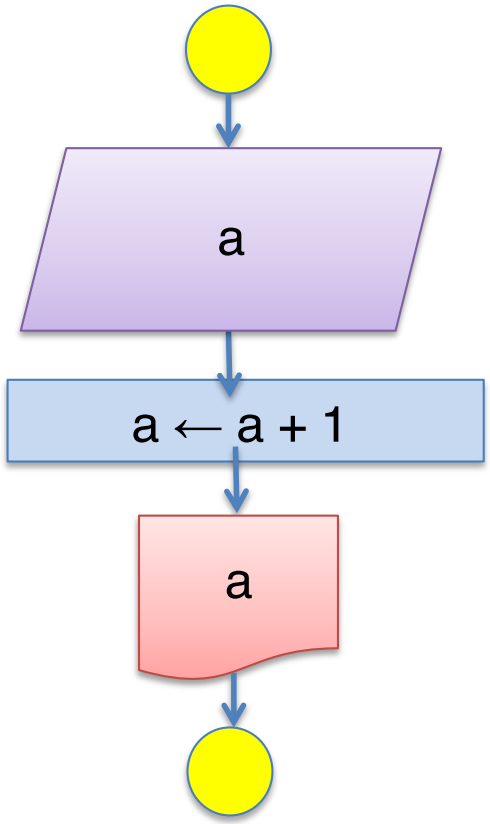

a
b
x ← a + b
x


a
b
x

Algoritmo per fare a + b.

Esercizio

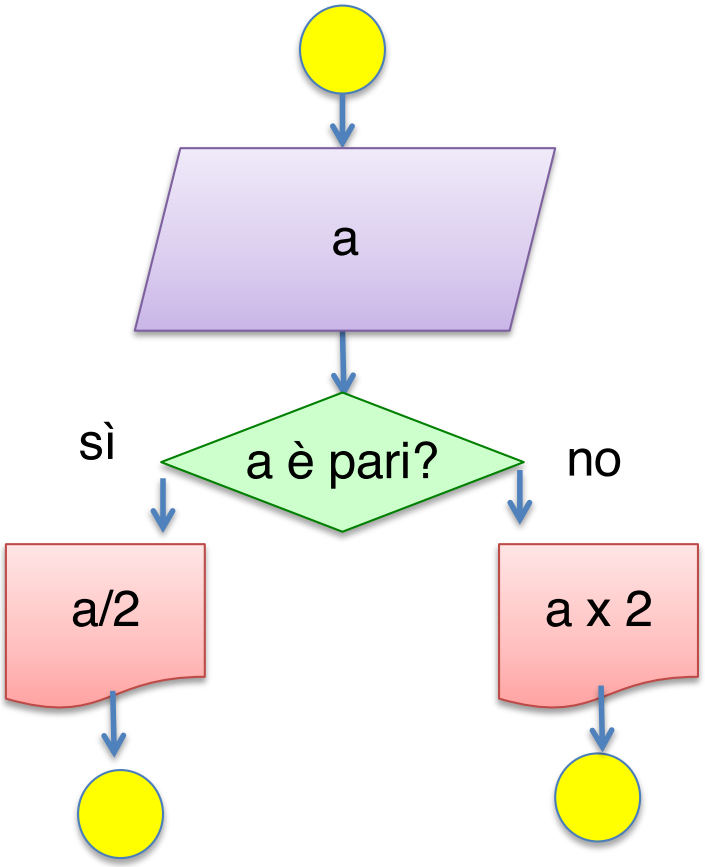
Fare il diagramma di flusso di un algoritmo che riceve in input un numero e restituisce in output il numero aumentato di 1.


a
a ← a + 1
a



Esercizio

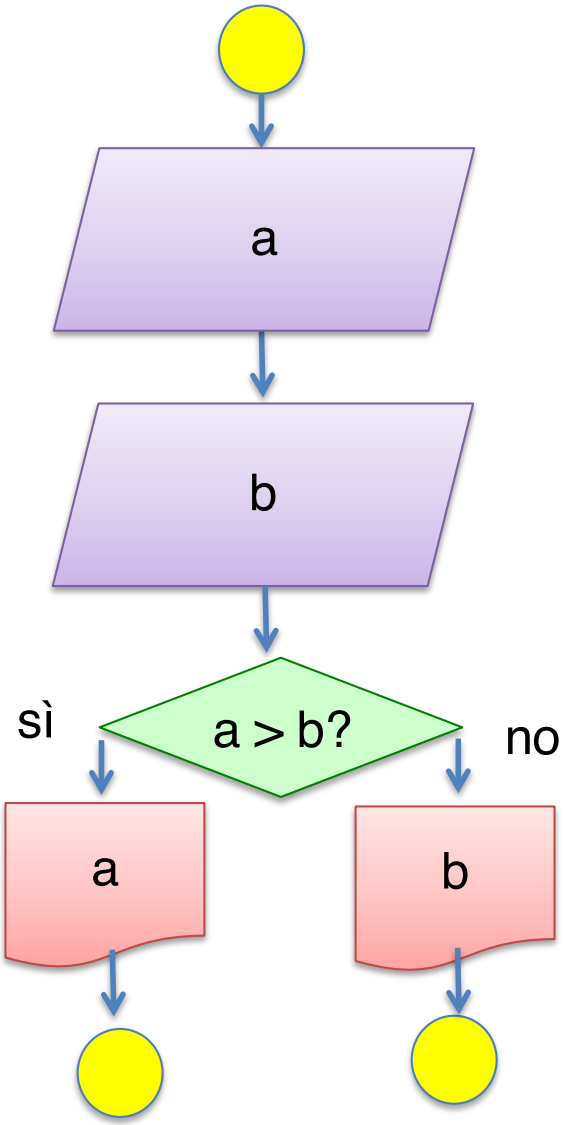
Fare il diagramma di flusso di un algoritmo che riceve in input un numero e restituisce il suo doppio se il numero è dispari, la sua metà se il numero è pari.


a
a è pari?
sì
no
a/2
a x 2

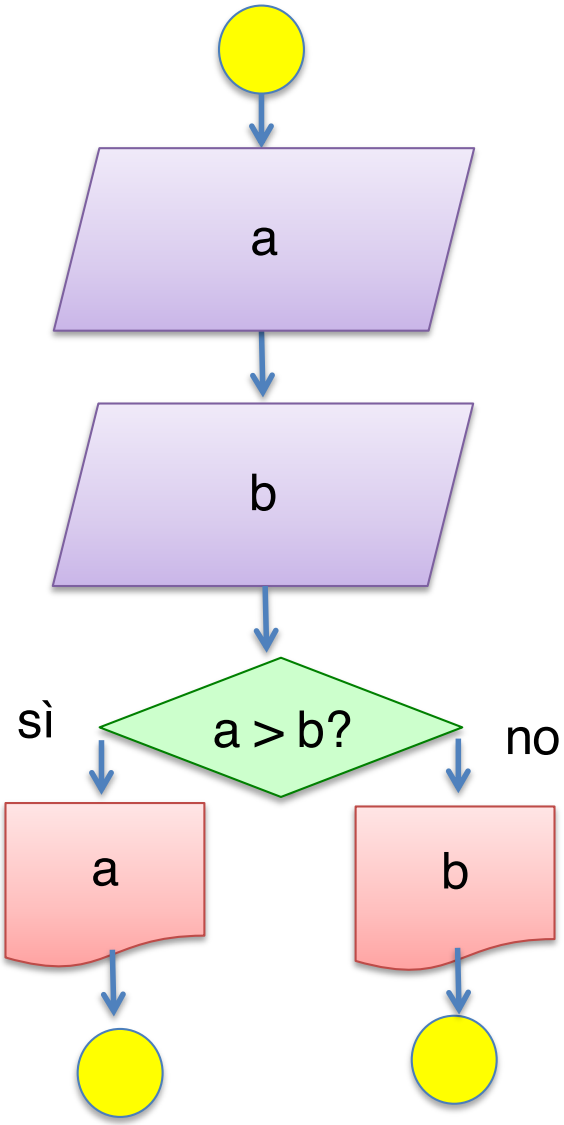


Esercizio

Fare il diagramma di flusso di un algoritmo che riceve in input due numeri e restituisce il più grande dei due.


a
b
sì
a > b?
no
a
b





e se a = b?
I casi limite vanno trattati con attenzione.



Esercizio

Fare il diagramma di flusso di un algoritmo che riceve in input due numeri e restituisce il loro massimo comune divisore.