```
def couner():
    global counting
    if start_btn['text'] != ...       -> (1)
        counting[0] += 1              -> (1)
        if counting[0] <= 100:        -> (1)
            counting[1] += 1          -> (1)
            counting[0] = 0           -> (1)
    else:
        counting_lb.config(--)        -> (1)
    win.after(10, couner)             -> (1)
```

```
def counting_command(command)
    if command == 'init' :
        start_btn.config(text=" ")       -> (1)
        couner() , bubble_sort()         -> (1)
```

```
counting_lb = tk.label(win, text=" ")    -> (1)
counting_lb.grid(coulumn=1, row=1)       -> (1)
start_btn = tk.button( __ )              -> (1)
start_btn.grid( __ )                     -> (1)

bubble = tk.Button( __ )                 -> (1)
bubble.grid(column=6, row=1)             -> (1)

build()             -> (1)
win.mainloop()      -> (1)
```

$o(T) = n^2 + 24$

$o(T) = n^2$

complixty (bubble sort) is n^2

```
def _bubble sort():
    global check
    global barlist
    global list
    n = len(list)
    for i in range(n-1):                          -> n
n-1     for j in range(n-i-1):                    n-i
            if (list[j] > list[j+1]):             n-i-1
                (list[j], list[j+1]) =
                (list[j+1], list[j])              -> 1
                barlist[j], barlist[j+1] =
                barlist[j+1], barlist[j]          -> 1
                swap(barlist[j+1],
                     barlist[j])                  -> 1
            yield
    check false                                   -> 1
```

$o(n) = n + n-1\,(n-i) + n-1\,(n-i-1)$

$n-1 + n-1 + n-1$

$= n + n^2 + in + i - n + n^2 + i - in$

$- n - n + 1 + 3n - 3$

$= 2n^2 + 2i + n - 2$

~~also~~ $\boxed{o(T) = n^2}$

```
def bubble_sort():
    global worker
    worker = _bubble_sort()     -> (1)
    animate()                   -> (1)
def animate():
    global worker
    if worker is not None:      -> (1)
        try:
            next(worker)
            win.after(50, animate)        -> (1)
        except StopIteration:
            worker = None                 -> (1)
        finally
            win.after_cancel(animate)     -> (1)
```

```
For bar in barlist:              → (1)
    bar= canvas. coords(bar)      → (1)
    length= bar[3] - bar[1]       → (1)
    list.append(length)           → (1)
For i in range (len(list)-1):    → n
        if list[i] == min(list):  → n-1
n-1 ←       canvas.itemconfig(__) → n-1
    elif list[i] == max(list):    → n-1
            canvas.itemconfig(__) → n-1
```

o(t) = 5n + 4 - 4 = 5n =
o(n)

total complixty =

$n^2 + 210 + n$

$o(n^2)$ → complixty

```
win. tk. TK()                      → (1)
win. tittle ('magic __')           → (1)
win. geometry ('__')               → (1)
win. config (background=__)        → (1)
canvas = tk. canvas(win, __, __)   → (1)
canvas. grid (____)                → (1)
canvas. config (____)              → (1)
def names():
    Frame = tk. Frame (____)       → (1)
    Frame. grid (____)             → (1)
    label = tk. label (____)       → (1)
    txt = tk. Text (____)          → (1)
    name. ____                     → (1)
    label. pack()                  → (1)
    text. pack()                   → (1)
    txt. insert (__)               → (1)
names()
def swap (pos_0, pos_1):           → (1)
    bar1, _, bar12, _ = canvas. coords(-)   → (1)
    bar21, _, bar22, _ = canvas. coords(-)  → (1)
    canvas_move (____)             → (1)
    canvas. move (____)            → (1)
def build():
    global barlist
    global list
    canvas. delete (__)            → (1)
    barstart = 6                   → (1)
    barend = 10                    → (1)
    barlist = []                   → (1)
    list = []                      → (1)
For bar in range (0, 30):          → 31
    randomy = random. randint(__)  → 3
    bar = canvas. ____             → 30
    bar list. append (bar)         → 30
    barstart += 10                 → 30
    barend += 10                   → 30
```

O(T) = 2~~946A~~ =/ ~~O(n)~~
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