COL1000: Introduction to Programming

Nuts & Bolts of Python — Nested Loops ..

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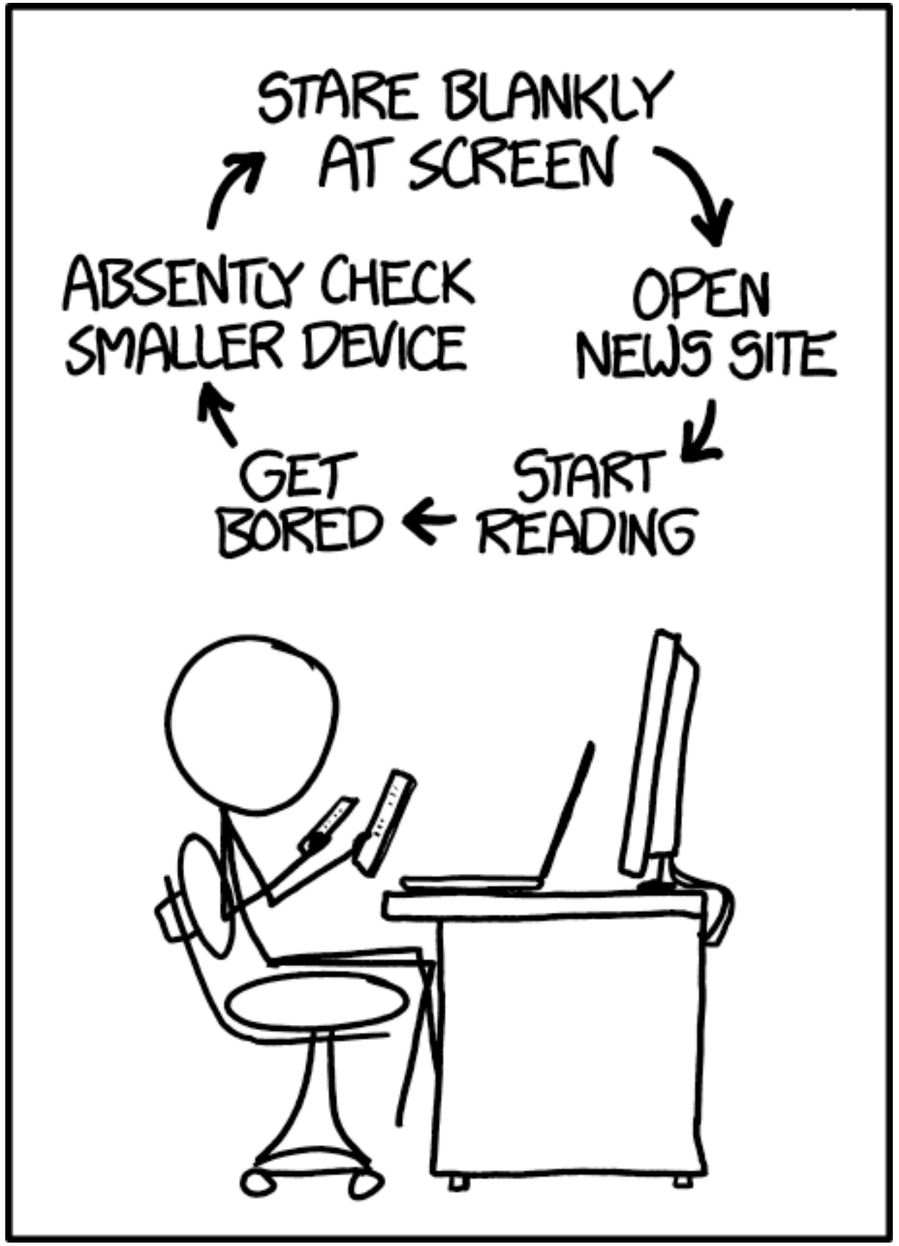
Reminders!

- Check https://moodlenew.iitd.ac.in/ General-> Course Homepage -> Schedule
  - Under Lecture Code —> SVS find the `lec7.py` and play with it!
- **Help sessions in CSC lab from 5-6 pm on all working days! (Use only if you need it)**
- Talk to me or send me a personal email re:course feedback!
- **Refer to the other instructors' slides and lecture code for more practice and ideas!**

LOOPS:


STARE BLANKLY AT SCREEN
OPEN NEWS SITE
START READING
GET BORED
ABSENTLY CHECK SMALLER DEVICE

Loops: Control Statement (RECAP)

- **break:** terminate the **enclosing** loop;
  - Works for `while` as well as `for` loops
  - E.g.:

```
cnt = 1
while cnt <= 10:
    if cnt == 3:
        break  # terminates the loop even if the loop condition is true!
    print(cnt)
    cnt += 1

print(f"Loop ended early:{cnt}")
```

Breaks the flow of execution and exits the loop!

Important to update the loop control variable

Formatted strings with expressions

Loops: Control Statement

- **continue:** skips the current iteration and goes to the next iteration of the **enclosing** loop;
  - Works for `while` as well as `for` loops
- **Live Programming**

— Loop5, Loop6

```
cnt = 1
while cnt <= 10:
    if cnt == 3:
        continue  # skips printing 3
    print(cnt)
    cnt += 1
```

Skips the rest of the loop onto the next iteration

Loops: Nested Loops

- **Loop within a loop:**
  - **Semantics:** For each iteration of outer loop, the entire inner loop (i.e. all the inner loop iterations) executes

```
i,j = 0,0
while i < 3:
  while j < 4:
    print(f”{i}:{j}:Inner Loop”}
  print(f”{i}:Outer Loop”)
```

What should be the output?

Perform hand tracing of the execution!

What is the fix?

Loops: Nested Loops

- **Loop within a loop:**
  - **Semantics:** For each iteration of outer loop, the entire inner loop (i.e. all the inner loop iterations) executes

```
i,j = 0,0
while i < 3:
  print(f”{i}:Outer Loop”)
  while j < 4:
    print(f”{i}:{j}:Inner Loop”}
    j += 1
  i += 1
```

What should be the output?

Can you explain?

Loops: Nested Loops

- **Loop within a loop:**
  - **Semantics:** For each iteration of outer loop, the entire inner loop (i.e. all the inner loop iterations) executes

```
i = 0

while i < 3:

    print(f”{i}:Outer Loop”)

    j = 0

    while j < 4:

        print(f”{i}:{j}:Inner Loop”}

        j += 1

    i += 1
```

What should be the output, now?

Can you explain?

Loops: Nested Loops (Practice Problem)

- **Given an input number `n` , test if it is prime**
    1. **Key steps, PRIME(n):**
        1. Set divisor `div = 2`
        2. Check if `div == n`
            1. `True` —> then stop and declared n to be prime
        3. Else check of `n % div == 0`
        4. If `True`, then n is certainly NOT prime
        5. If `False`, then increment div by 1 and repeat from step 2

Loops: Nested Loops (Practice Problem)

- **Given an input number `n`, print all primes unto `n`**

  1. **Key steps:**

     1. Set i = 2
     2. **If `(PRIME(i))` —>** Print (f“{i} is prime”)
     3. Else —> `i += 1` and repeat from Step (2) until `i == n`