CL15 – while Loops
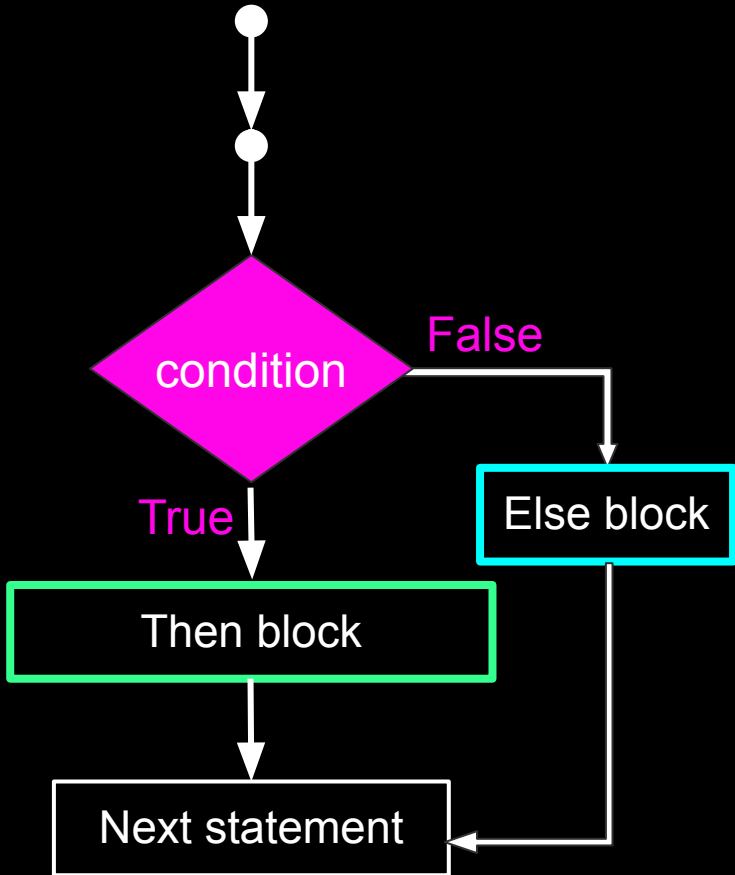
Recall: if-then-else / *Conditional* Statements


```
if <condition>:

    <then, execute these statements>

else:

    <execute these statements>

<rest of program>
```
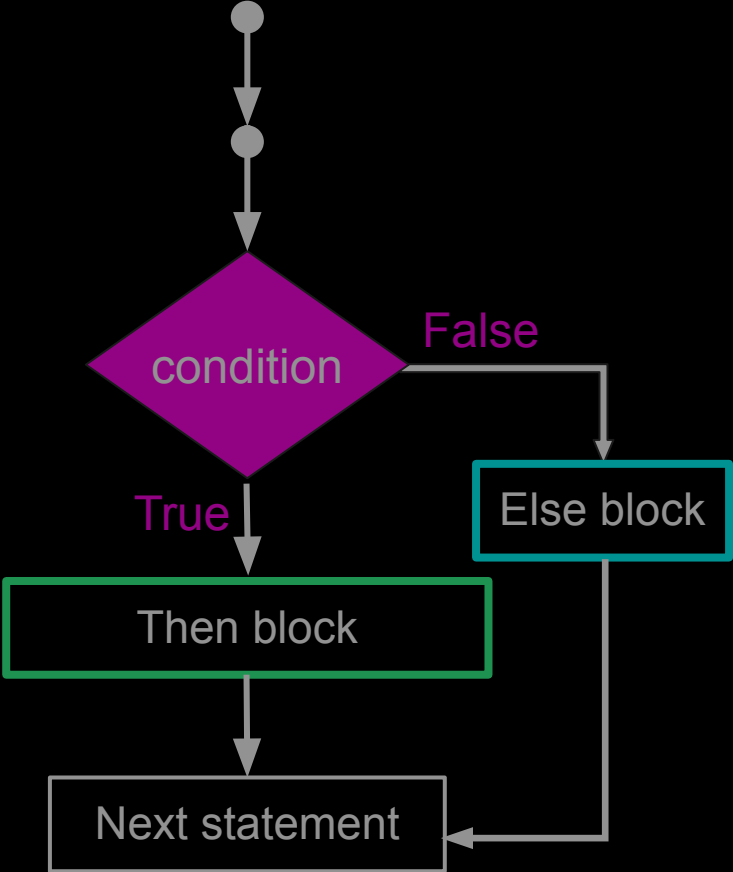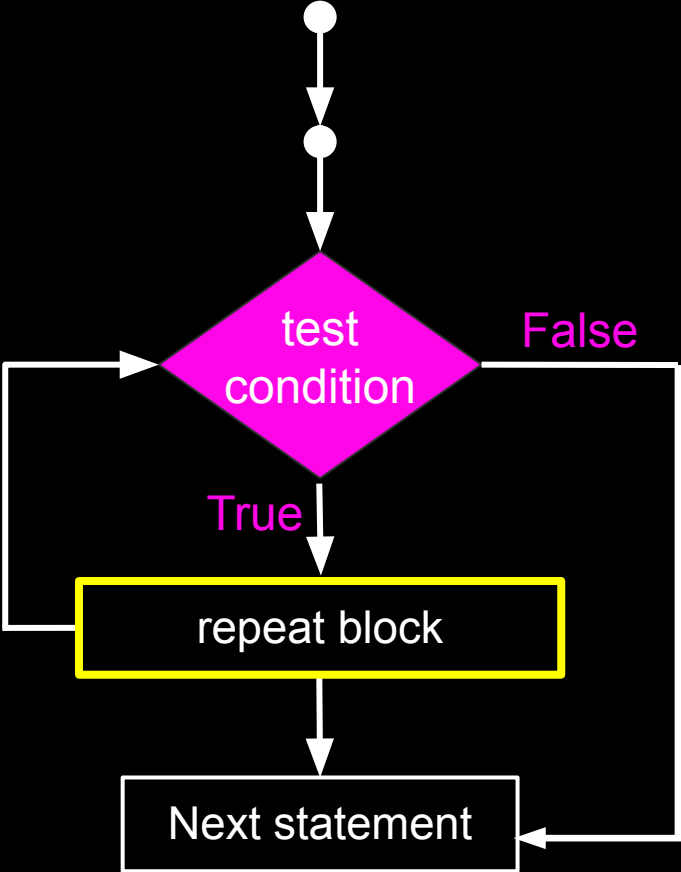
if-then-else Statements

while Loop Statements

condition

False

True

Then block

Else block

Next statement

test condition

False

True

repeat block

Next statement

while Loop Statements

```
while <condition>:

    <execute indented repeat block>

<rest of program>
```
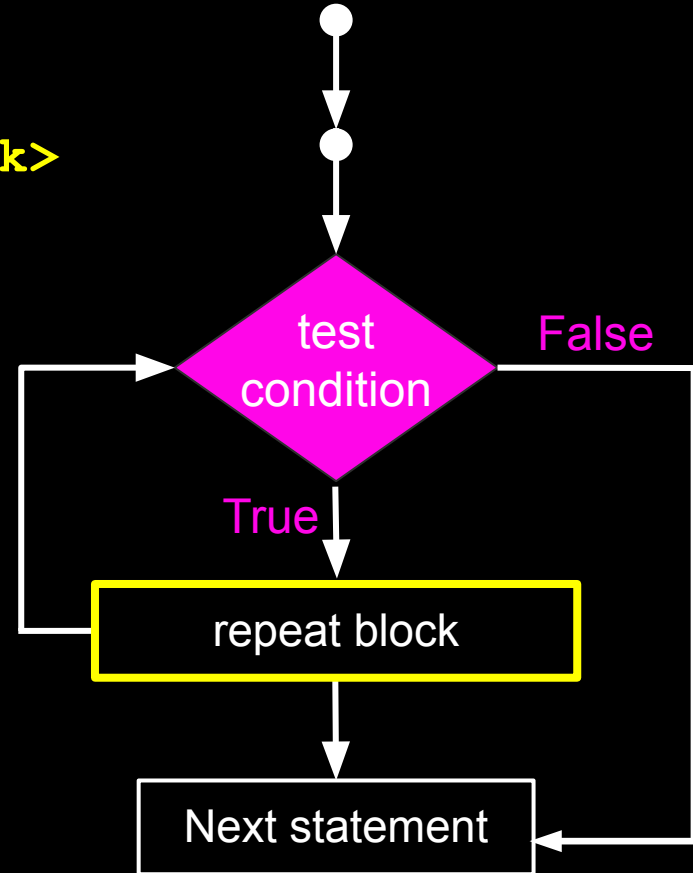
while Loop Statements

```
while <condition>:

    <execute indented repeat block>

<rest of program>
```

When we reach a while loop statement in code…
- While the **condition** evaluates to **True**:
  - Execute the **repeat block**
  - Jump back up to the test if the **condition** is still True. This process will repeat ("iterate") until the condition is False. In which case…
- When the **condition** evaluates to **False**:
  - *Skip past* the **repeat block** and continue on to the next line of code at the same level of indentation as the **while** keyword
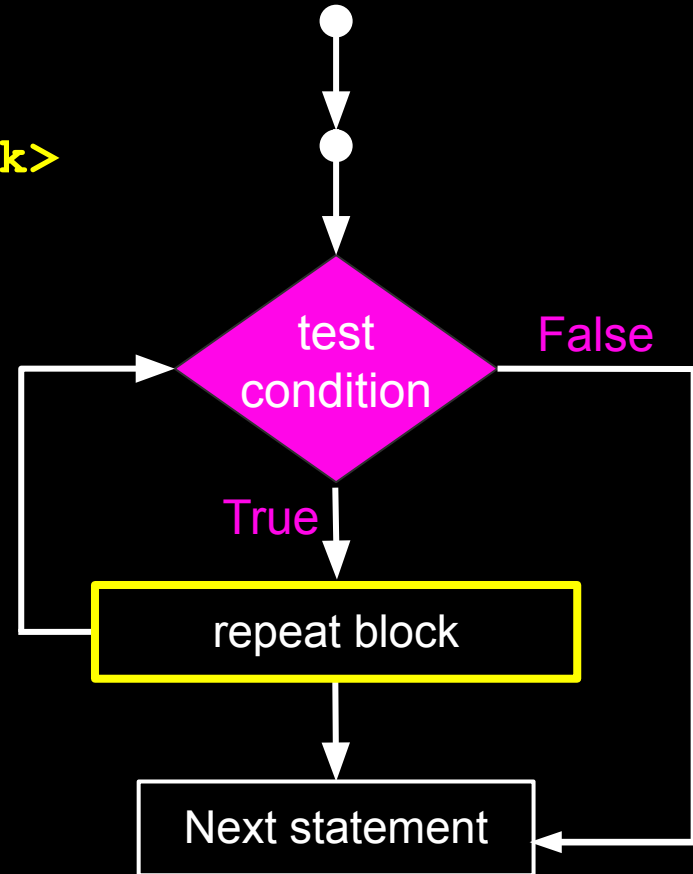
test
condition

False

True

repeat block

Next statement

Let's try writing a function, `count_to_n`, that will print values from 0 to n using a `while` loop!
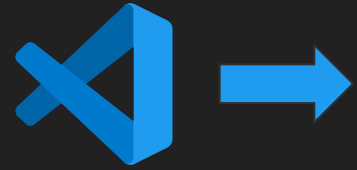
Requirements:

Name: `count_to_n`
Parameter: `n`, an int
Return type: `None`

We'll need:
- Local variable (to keep track of the count)
- `while` loop (to iterate through each value of count, from 0 to `n`)

Output:

```
Count is: 0
Count is: 1
Count is: 2
Count is: 3
Count is: 4
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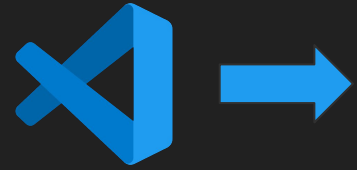
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Challenge: Pause the video here and try writing this function definition by yourself!

```python
def count_to_n(n: int) -> None:
    count: int = 0
    while count <= n:
        print(f"Count is: {count}")
        count = count + 1


count_to_n(n=4)
```

A common problem: the dreaded *infinite loop*

If a condition in a `while` loop never becomes False, the loop will continue indefinitely.

To prevent this:

- Ensure that your loop's condition will eventually be False!

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Which line of code in the code listing prevents an *infinite loop* from occurring? What would happen without it?

Common use cases of `while` loops

- **User input validation:** Prompt the user for a valid input until they give one to you!
    - *Think:* our word-guessing game example, or Wordle!
- **Game loops:** Keep a game running until some condition is met
    - Common examples: You run out of lives or attempts
- Iterating through values
    - Examples:
        - Counting from 0 to n ✅
        - Looping through every character in a string (via subscription notation)

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```python
def reverse(a_str: str) -> str:
    """Reverse a string"""
    idx: int = 0
    result: str = ""
    while idx < len(a_str):
        result = a_str[idx] + result
        idx = idx + 1

    return result


print(reverse(a_str="abc"))
```