Why did the computer show up late to work?

Thank you Colton!

It had a hard drive !

Source: https://www.rd.com/jokes/computer/

# CMPT 120

Lecture 6 – Chatbots

Robustness -> User Validation, Efficiency,
Testing (Step 4 of Software Development process)
and Errors

## Feedback – Assignment 0

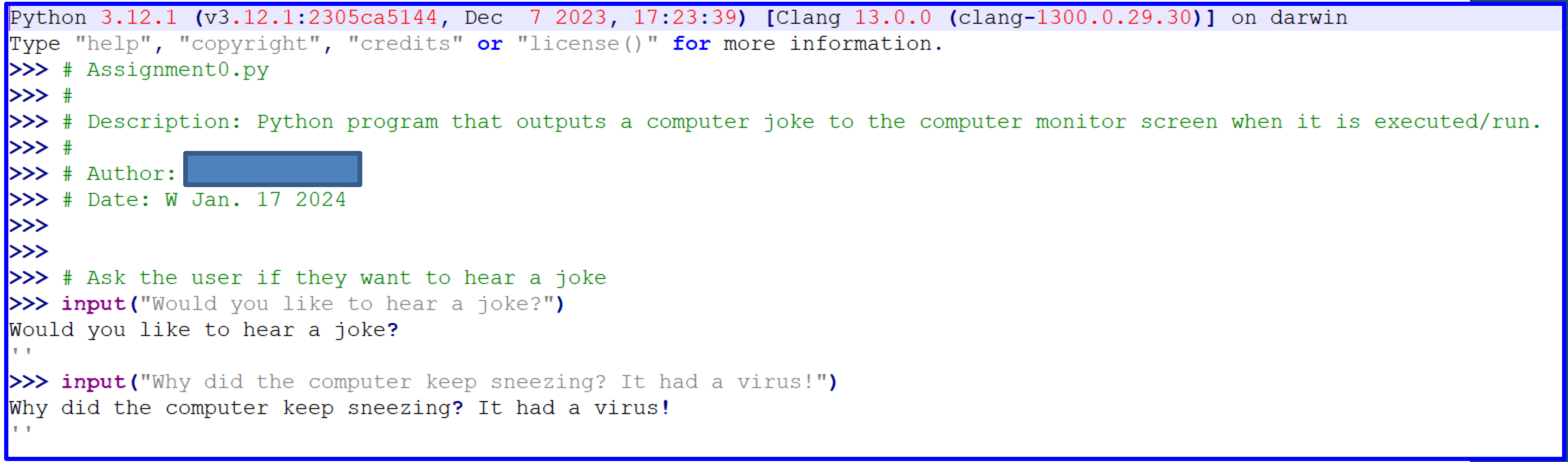
- Thank you for all your jokes!
- Lots of great jokes!
- Some of you took the opportunity to practise the Python building blocks we have learnt so far!

- Make sure you satisfy the **requirements**
  - *Write a Python program that* ***outputs*** *a* ***computer joke*** *to the computer monitor screen when it is executed/run.*
    - This means: use **print( … )** function
    - Not a computer joke
  - *Your program must also* ***print*** *the source of your computer joke, i.e., the link or location where you found the joke.*
    - Do not put your source in a comment

- Reminder:
  - For Assignment 1: there are no extension given
    - This means that you have to submit your program on time.

# Careful!

- This is on the Shell:



```
Python 3.12.1 (v3.12.1:2305ca5144, Dec  7 2023, 17:23:39) [Clang 13.0.0 (clang-1300.0.29.30)] on darwin
Type "help", "copyright", "credits" or "license()" for more information.
>>> # Assignment0.py
>>> #
>>> # Description: Python program that outputs a computer joke to the computer monitor screen when it is executed/run.
>>> #
>>> # Author: [redacted]
>>> # Date: W Jan. 17 2024
>>>
>>>
>>> # Ask the user if they want to hear a joke
>>> input("Would you like to hear a joke?")
Would you like to hear a joke?
''
>>> input("Why did the computer keep sneezing? It had a virus!")
Why did the computer keep sneezing? It had a virus!
''
```

- It is not a Python program created using the Editor!

- Make sure you submit the right program! ☺

# Last Lecture

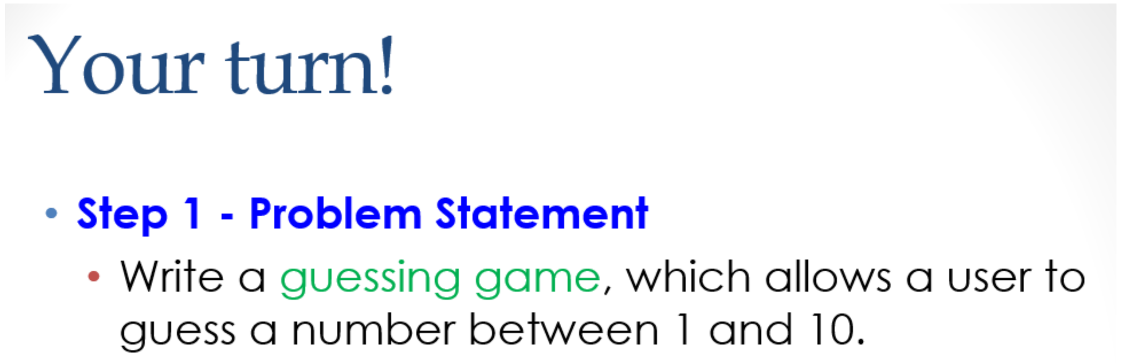
- ✓We continued practicing using conditional statements in our Python programs
  - ✓What if there are many conditions (many branches)?
  - ✓What if we are dealing with integers?
  - ✓Can these conditional statements be nested?
- ✓We also played around Boolean values and Boolean expressions

## Let's finish this one first!

- **Step 1 - Problem Statement**
  - Write a grade-to-letter grade converter that converts a grade into letter grade.

# Today's Menu

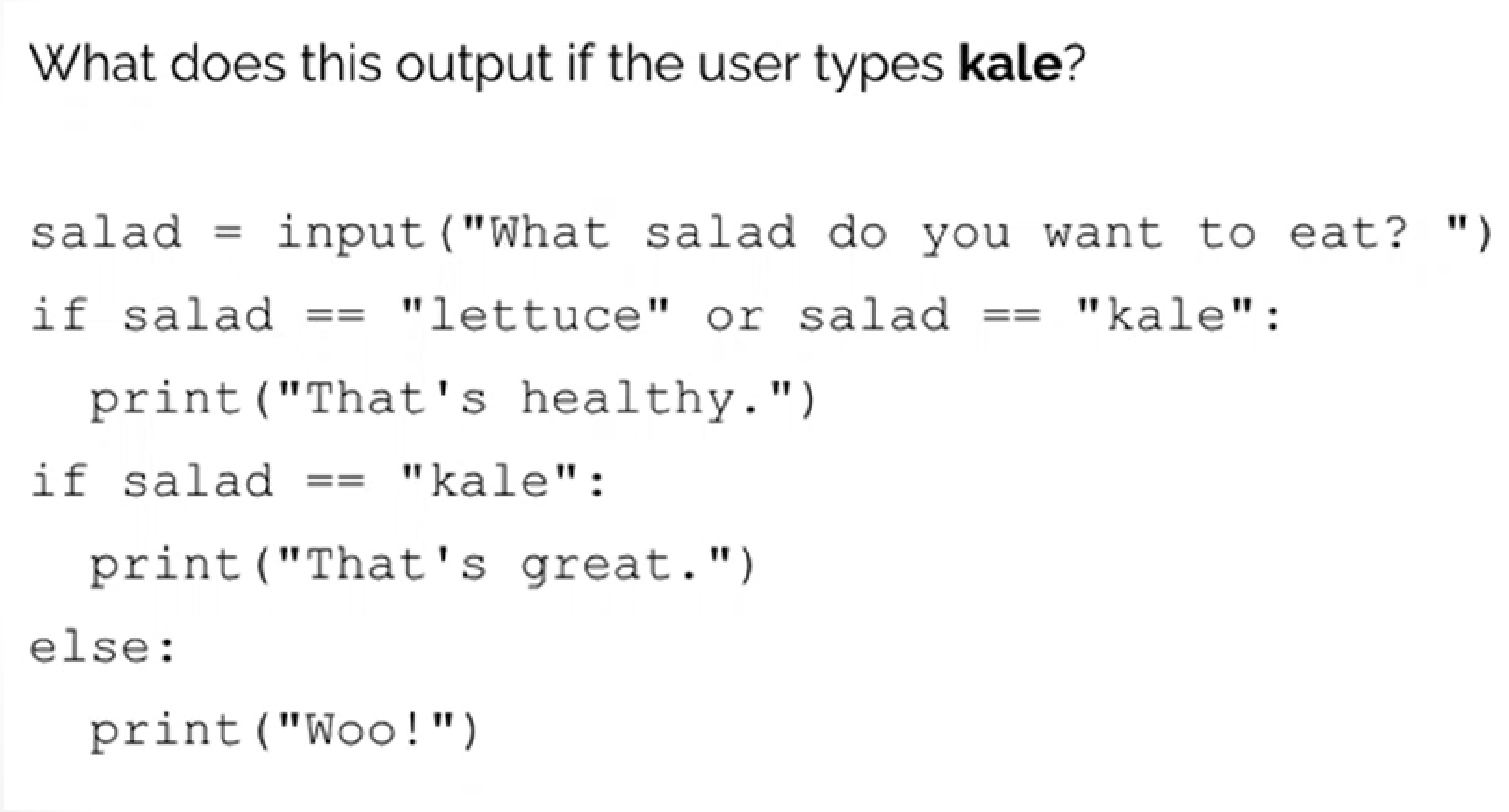
- Improving grade-to-letter grade converter
  - Robustness -> User input Validation
  - Efficiency
- Step 4 Testing and Errors
- Our Guessing Game:



## Your turn!

- **Step 1 - Problem Statement**
  - Write a guessing game, which allows a user to guess a number between 1 and 10.

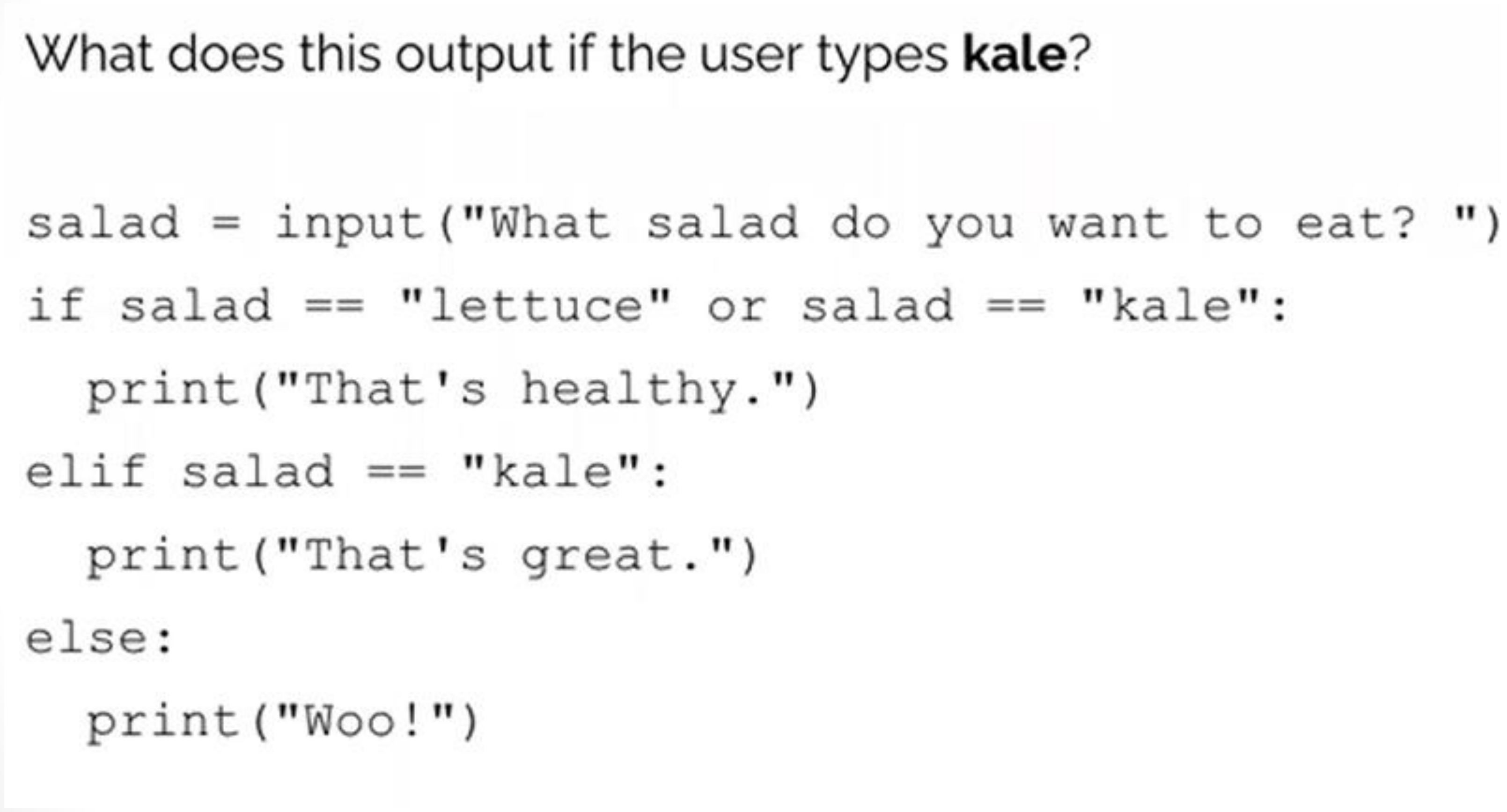
# Let’s practice a little!



What does this output if the user types **kale**?

```
salad = input("What salad do you want to eat? ")
if salad == "lettuce" or salad == "kale":
  print("That's healthy.")
if salad == "kale":
  print("That's great.")
else:
  print("Woo!")
```

# How about this one?



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```

# Hand Tracing

- What is it?
  - When a software developer manually goes through her/his code (program) and “execute” it as if s/he was a computer, mimicking the Python Interpreter
- Why doing it?
  - To figure out what our program does/produces, hence to verify whether our program is solving the problem
  - To determine whether our program contains any errors

# Robustness

**strongly** formed or constructed

- Merriam Webster

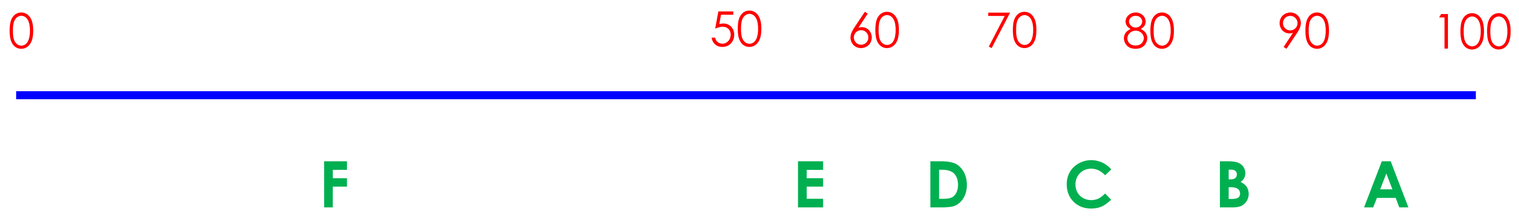
able to **withstand** or **overcome adverse conditions**.

- Oxford Dictionary

- What if the user enters a grade < 0 or > 100 ?
- **User Input Validation**

# Efficiency

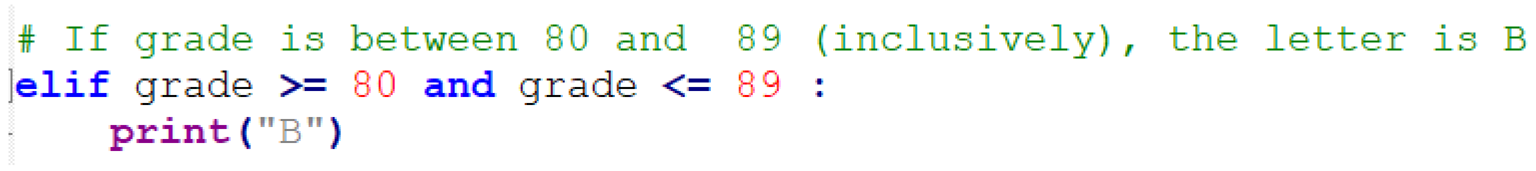
- Consider this axis:



- Let’s go to our Python code!

# More efficient? How?

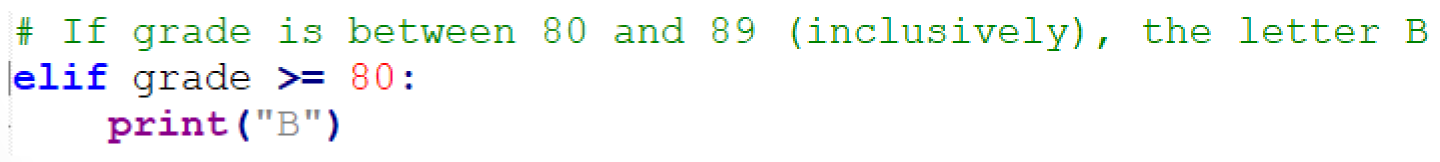
Original version:



```
# If grade is between 80 and  89 (inclusively), the letter is B
elif grade >= 80 and grade <= 89 :
    print("B")
```

versus

improved version:



```
# If grade is between 80 and 89 (inclusively), the letter B
elif grade >= 80:
    print("B")
```

## Step 4 Testing

- Syntax error
  - Example: `print(int("23bottles))`
- Runtime error
  - Example: `print(int("23bottles"))`
- Semantic error

- When you test your code
  - A test case is made of:
    1. Test data
       - Data - must be specific
       - We need to choose this data before we execute our program
    2. Expected result
       - The result we expect our program to produce with this data
       - We need to compute it before execute our program
    3. Actual result
       - The result our program actually produced (and printed on the screen?)
    - Our program passes the test if expected result = actual result
  - How many test cases must we create?

# Last Lecture - Your turn!

- **Step 1 - Problem Statement**
  - Write a guessing game, which allows a user to guess a number between 1 and 10.

## Step 4 – Testing

- Testing our guessing game:
  1. Test case 1 : input != number to guess
  2. Test case 2 : input == number to guess

  - How to know the number to guess?
    - The trick is to …

# Robustness - User Validation

- What if the user enters a guess < 1 or > 10
  - We know how to deal with this situation!
    - Testing our new version of our guessing game:
      1. Test case 1 : input != number to guess
      2. Test case 2 : input == number to guess
      3. Test case 3 : invalid input: 53 ( > 10)
      4. Test case 4 : invalid input: -21 ( < 1 )

# Robustness - User Validation

- What if the user enters "banana"?
  - Misbehaving user versus well-behaved user
    - Testing our new version of our guessing game:
      1. Test case 1 : input != number to guess
         - How to know the number to guess?
           - The trick is to …
      2. Test case 2 : input == number to guess
      3. Test case 3 : invalid input: 53 ( > 10)
      4. Test case 4 : invalid input: -21 ( < 1 )
      5. Test case 5 : invalid input: "banana"

## Review: How to construct a Boolean condition?

Some Python functions return numerical values
Here are some examples:

- **len("hello")** that returns **5,**
- **int("27")** that returns **27**
- **"hello".find("lo")** that returns **3**

Similarly, there are Python functions that return Boolean values
Here are some examples:

- **all([1<2,2<4,5==5])** that returns **True,**
- **"123456".isdigit()** that returns **True** ,
- **"123456".isalpha()** that returns **False**

**SYNTAX:** `.<function>(…)` `<function>(…)` `operator`

```
Example:
<string>.isdigit( )
<string>.isalpha( )
etc…
```

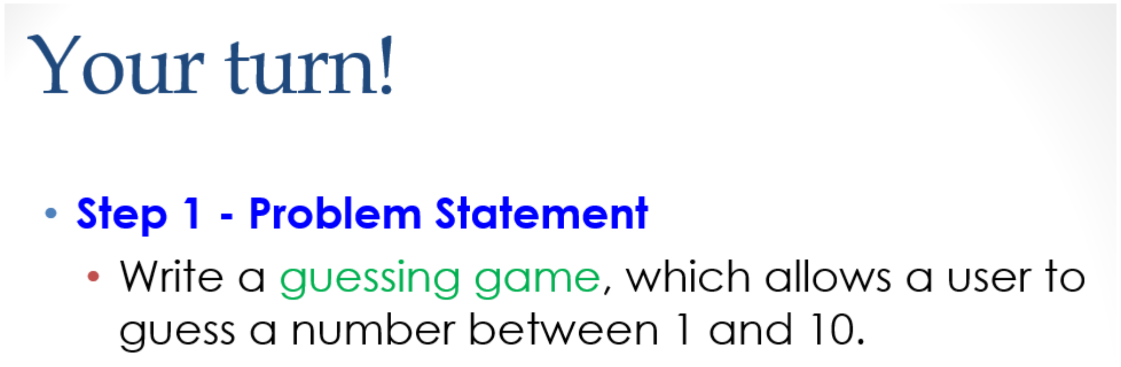
```
Example:
all(…)
etc…
```

Example: the **in** containment test operator
etc…

**Result of Boolean expression: True or False**

# Summary

- Feedback from Assignment 0
- Improving grade-to-letter grade converter
  - Robustness -> User input Validation
  - Efficiency
- Step 4 Testing and Errors
- Our Guessing Game:



Your turn!

- **Step 1 - Problem Statement**
  - Write a guessing game, which allows a user to guess a number between 1 and 10.

# Next Lecture

- Let's see how much we have learnt so far by having our first **Practice Exam**!
- Great chance for us …
  - To hone your software development skills
  - To become familiar with:
    - Types of questions asked in CMPT 120 exams
    - Writing code on paper
    - To work in teams
    - And to ask all your questions!
- Our first in-class activity -> 1%
  - I will ask you to hand in your answer to one of the questions in our Practice Exam #1

Course grading scheme on our course website: ***Best 7 in-class exercises out of 10: 1% each, for a total of 7%***