CS1301-Into to Computing

Day 1

Welcome to CS1301

- Instructor:
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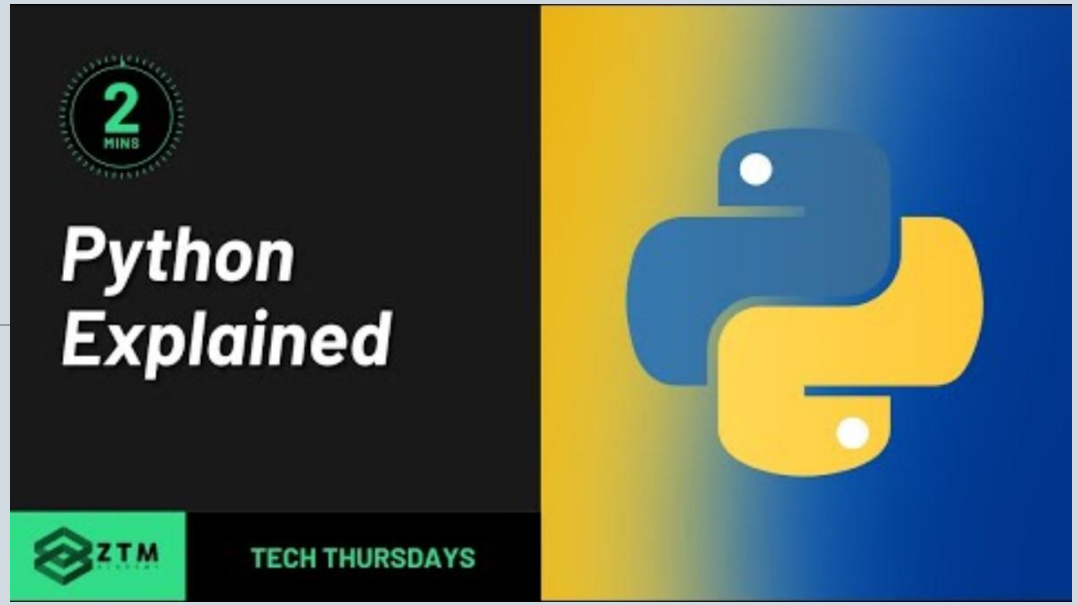
  - Office: CCB 255
  - Office Hours:
    - Tuesday @ 01:00 - 03:00 PM
- Head TA:
  - Chris Liding (zliding3@gatech.edu)

CS1301 Sections A, C

- GT CANVAS Course:
  - Intro to Computing - CS-1301- A/C
- CS1301 Syllabus:
  - FALL 2024
- CS1301 Weekly course schedule:
  - Living Schedule
- CS1301 Textbook:
  - How to Think Like a Computer Scientist: Learning with Python 3

Day 1 Miniquiz

The Python Language



- Who: Guido van Rossum
- When: In February 1991
- Why:
  - Rossum wanted a language that could be used to create programs quickly, and be easy to modify
    - Python has a simple and clean syntax that is easy to read
    - Python can be coded in a plain text editor
    - Python uses an interpreter that reads your program and executes it
    - Python is a high-level language that can be used in many areas: app development, machine learning, data science, game development, data analytics, ...
    - Python is portable, meaning it can run on different kinds of computers with few or no modifications.

The Python Language

The instruction details (**syntax**) looks different in various languages, but a few basic instructions appear in just about every language:

- Input
  - Get data from the keyboard, a file, or some other device.
- Output
  - Display data on the screen or send data to a file or other device.
- Expressions
  - Perform mathematical operations in operator precedence (PEMDAS).
- Conditional execution (decision making)
  - Check for certain conditions and execute the appropriate sequence of statements.
- Repetition (looping)
  - Perform some action repeatedly, usually with some variation.

The Python Language

Python is translated and run using the Python Interpreter:

- *immediate/interactive mode* - you type Python expressions into the Python Interpreter window (**Shell**) and the results are show immediately at the Python prompt (**>>>**). The prompt indicates that the interpreter ready for instructions.

- *script mode* - you can write a program in a file (**Editor**) and use the interpreter to execute the contents of the file (script). Scripts can be saved to disk, printed, and so on. Scripts have names that end with **.py**.

Using Python

IDLE (Integrated Development and Learning Environment): single program that provides tools to write, execute and test a program

- Automatically installed when Python language is installed
- Runs in interactive mode or editor mode
- Has built-in text editor with features designed to help write Python programs
- Python can be downloaded from the official language website:
  - https://www.python.org/

Using Python (IDLE)

When you start Python in interactive mode, you will see a prompt

- **>>>**
- Indicates the interpreter is waiting for a Python statement to be typed
- Prompt reappears after a statement is executed
- Error messages are displayed If you incorrectly type a statement
- Statements entered in interactive mode are not saved as a program

Using Python (IDLE)

Using Python in script mode, you will see a blank window

- Indicates the interpreter is waiting for Python statement(s) to be typed
- Save statements to a file, the filename must have a **.py** extension
- IDLE (Python Editor) is a text editor with features designed to help write Python programs

Py Basics: Error Types

- There are two Categories of Errors:
  - Compile-time Errors (aka Syntax Errors)
    - Spelling, capitalization, punctuation
    - Ordering of statements, matching of parenthesis, quotes…
    - No executable program is created by the compiler
    - Correct first error listed, then compile again.
    - Repeat until all errors are fixed
  - Logic Errors (aka Runtime or Semantic Errors)
    - The program runs, but produces unintended results
    - The program may ‘crash’

Compile-time: Syntax Errors

- Syntax errors are caught by the compiler
- This happens if you:
  - Incorrectly capitalize a word
  - Leave out quotes
  - Mismatch quotes
  - Don’t match brackets

Logic: Runtime or Semantic Errors

- This happens if you
  - Divide by zero
  - Misspell output
  - Forget to output
- Programs will compile and run
  - The output may not be as expected
  - Also called exceptions because they usually indicate that something exceptional (and bad) has happened.
  - The compiler will not generate any error messages, but the program will not do the right thing.

Python Basics:

- **Comments**: notes of explanation within a program
  - Ignored by Python interpreter
  - Intended for a person reading the program's code
  - Begin with a # character
  - Explains the purpose of the code
  - End-line comment: appears at the end of a line of code
- **Function**: piece of code that performs a single task
- **Argument**: data given to a function

Py Basics: Variables

- Variable - is a named memory location that holds a value
- Value - is one of the fundamental pieces of data that a program manipulates.
  - it can be classified by its **data type**
    - strings belong to the class **str**
    - whole numbers/integers belong to the class **int**
    - decimal point numbers belong to a class called **float**, because these numbers are represented in a format called *floating-point*.
    - Boolean values belong to the class **bool**

Py Basics: Variables

- should be meaningful, and are **case sensitive** (Num is not num)
- first character must be a letter or an underscore
- can contain both letters, digits, and underscores
- cannot begin with a digit
- cannot be Python keywords

and	as	assert	break	class	continue
def	del	elif	else	except	exec
finally	for	from	global	if	import
in	is	lambda	nonlocal	not	or
pass	raise	return	try	while	with
yield	True	False	None		

Py Basics: class **str**

- Any printable text enclosed in quotes is a string
  - 'Hello world', "14", '3.87', "GT", """!"""
  - Strings in Python are enclosed in
    - single quotes (')
    - double quotes (")
    - triple quotes of each (''' or """)
      - used for function documentation: docstring

Py Basics: class **int , float, bool**

- whole numbers/integers belong to a class called **int**
  - 4200
  - 5
  - 0
- decimal point numbers belong to a class called **float**
  - 3.0
  - 5.65715
  - 187423.2
- Boolean values belong to a class called **bool**
  - True
  - False

Py Basics: Expressions

- Are a combination of values, variables, operators, and calls to functions.
- If you type an expression at the Python prompt, the interpreter evaluates it and displays the result.
- The evaluation of an expression produces a value, which is why expressions can appear on the right-hand side of assignment statements.
- A value all by itself is a simple expression, and so is a variable.

Py Basics: Statements

- Are instructions that the Python interpreter can execute.
  - Functions calls
  - Operations
- There are different kinds of statements
  - assignment, while, for, if, and import.
- Assignment statement: used to create a variable and make it reference data
  - General format is *variable* = expression
  - Assignment operator: the equal sign (=)
  - Example: age = 29

After Class

1. Log into CANVAS
   - Review the course tabs
     - Ed Discussion
     - Syllabus
     - Assignments
     - Quizzes
     - Gradescope
     - Files
   - Update your Profile image
2. Read textbook Chapter 1 and Chapter 2

Install Python

1. In your *Documents* folder create a **CS1301** folder
2. In your browser go to www.python.org/downloads/
3. DO NOT select the latest version
4. Look under the title **Looking for a specific release?**
   - Select Release Version **3.11.9**
5. Look under Files
   - Select the **Recommend** version

Time to program

1. Launch Canvas
   - Select this course KEARSE- CS1301-A/C
   - Click Files - Lecture notes - **01notes.py, 01code.py**
   - **download the files to your CS1301 folder**
2. Launch IDLE
   - Click on the File - Open
   - Navigate to your CS1301 folder
   - Click on the downloaded file for today
   - Click the Open button