LECTURER: TAI LE QUY

PROGRAMMING WITH PYTHON

TOPIC OUTLINE

Introduction to Python	1
Classes and Inheritance	2
Errors and Exceptions	3
Python Important Libraries	4
Working with Python	5

TOPIC OUTLINE

Version Control

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UNIT 5

WORKING WITH PYTHON

STUDY GOALS

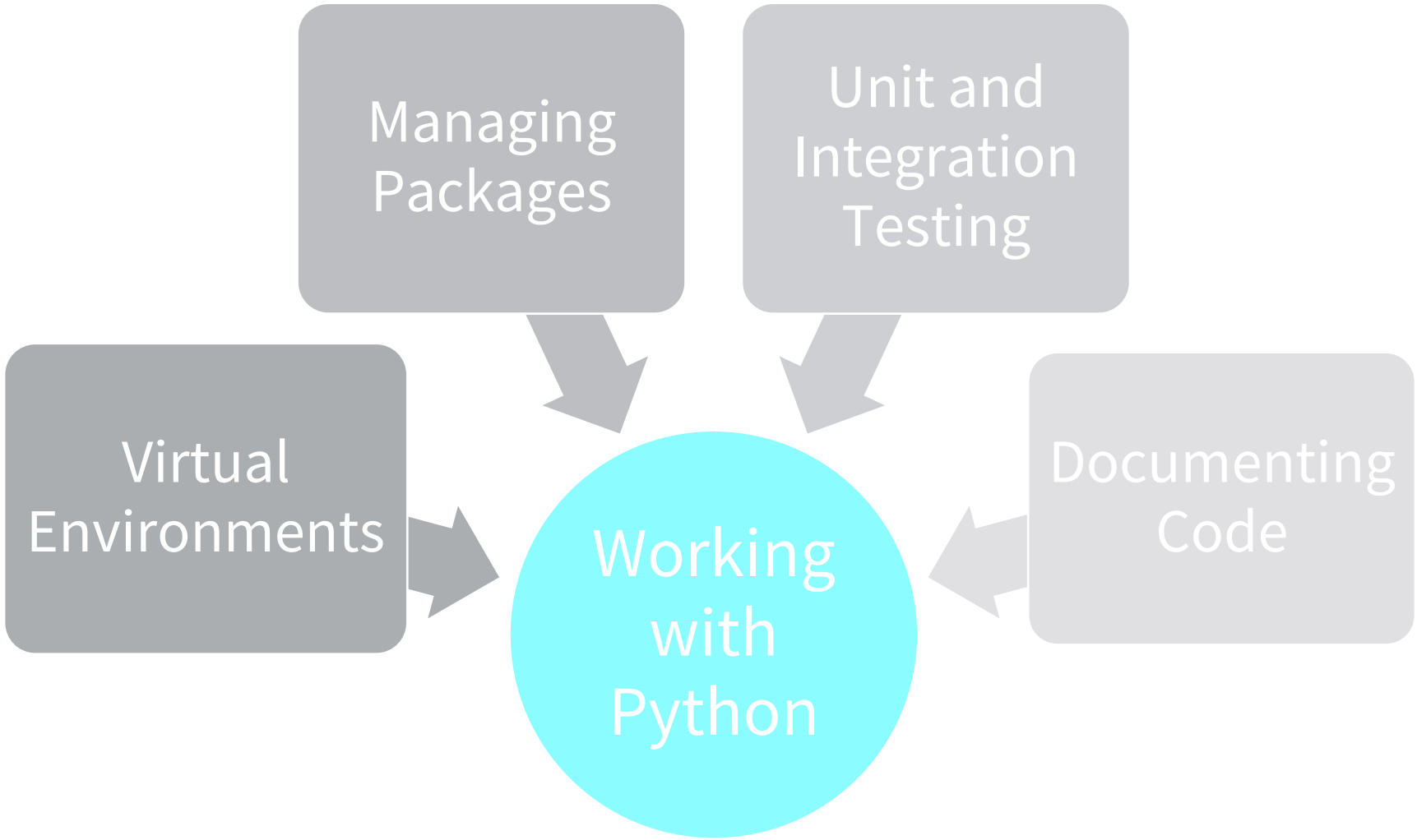
- Know what is a virtual environment
- Understand how to create a virtual environment with Anaconda distribution package in Windows
- Explore Python packages using “pip” and “conda” modules
- Learn to define unit and integration tests
- Comprehend how to use “unittest” testing framework
- Comment source code accordingly

EXPLAIN SIMPLY

1. What are virtual environments?

2. Why is software testing important?

3. What is the purpose of documenting code?


Managing Packages
Unit and Integration Testing
Virtual Environments
Working with Python
Documenting Code

Virtual environment = system that implements, manages and controls multiple instances

- **“venv”**: popular setup tool
- Lightweight independent VE
- Improves projects’ structure organization
- Creating virtual environments:

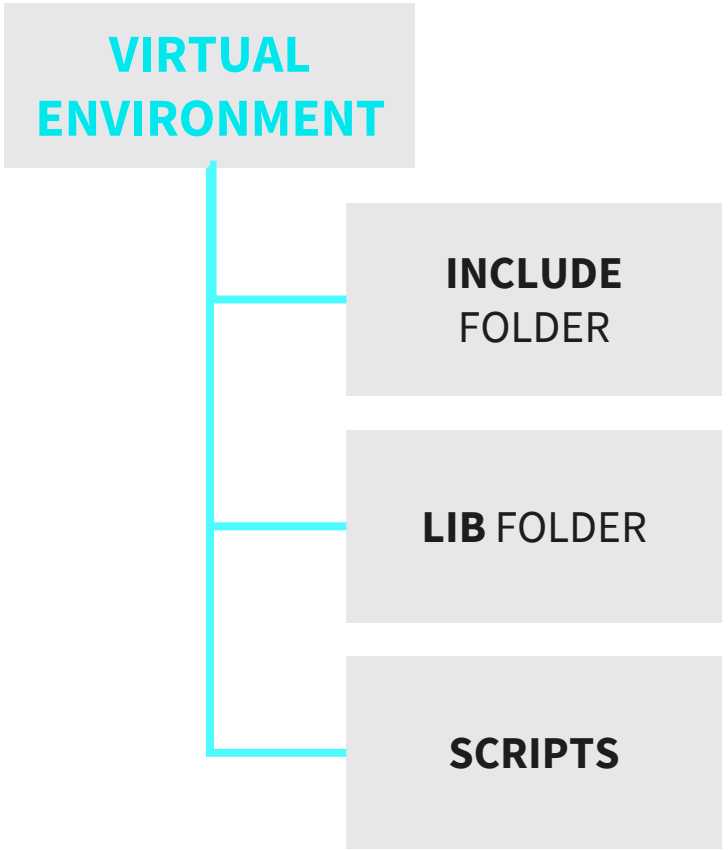
  python -m venv <directory>
- Python venv activation:

  <directory> \Scripts\activate.bat
- Deleting a Python venv

  deactivate

  # remove the directory

  rm -r <directory>



VIRTUAL ENVIRONMENTS

- Create a virtual environment using Anaconda

  conda create -n yourenvname python=x.x

  - See a list of Python version: conda search "^python$“
- Activate your virtual environment

  source activate yourenvname

  - Install additional Python packages to a virtual environment

  conda install -n yourenvname [package]

  - Deactivate your virtual environment

  source deactivate

  - Delete a no longer needed virtual environment

  conda remove -n yourenvname -all

Source: https://uoa-eresearch.github.io/eresearch-cookbook/recipe/2014/11/20/conda/

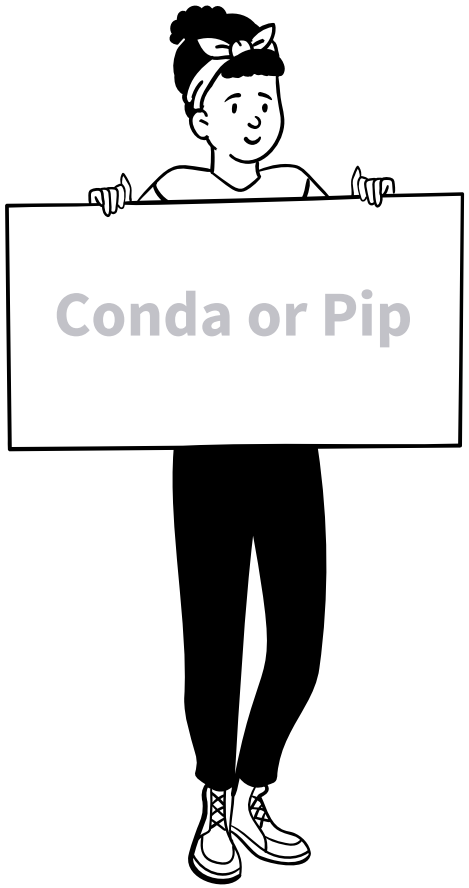
Pip: public repository to install Python packages

- **pip install package_name** to install a package
- **pip list** to see a list of packages installed in your VE
- **pip search package_name** to search for a package
- **pip show package_name** to check the status of a package
- **pip uninstall package_name** to remove a package

Conda: main package used with command line

- **conda create** to create a new environment from specified packages
- **init** to initialize conda for shell interaction
- **install / list / uninstall** work similarly as with pip
- **conda update package_name** to upgrade a package
- **conda --help** to search for help in using conda

	Conda	Pip
Manages	Binaries	Wheels or source
Require compilers	No	Yes
Package types	Any	Python-only
Create environment	Yes, built-in	No, requires venv
Package sources	Anaconda repo and cloud	PyPI



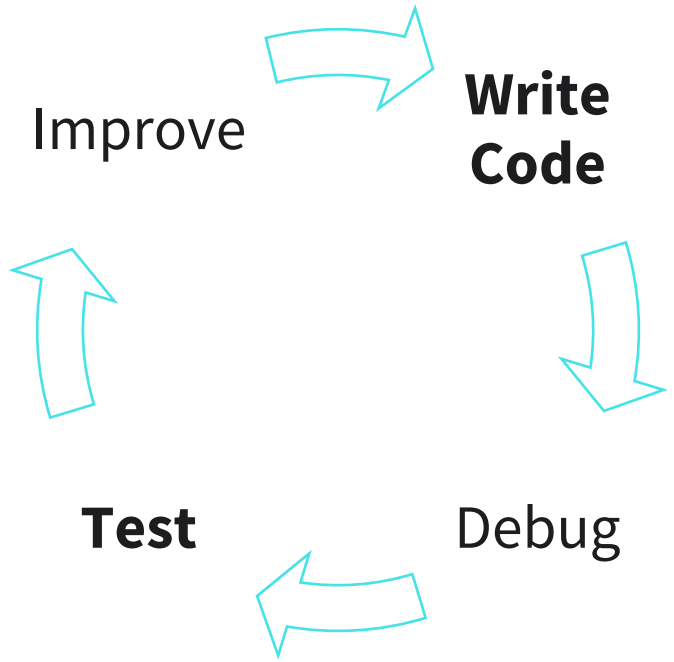
UNIT AND INTEGRATION TESTING

Unit test

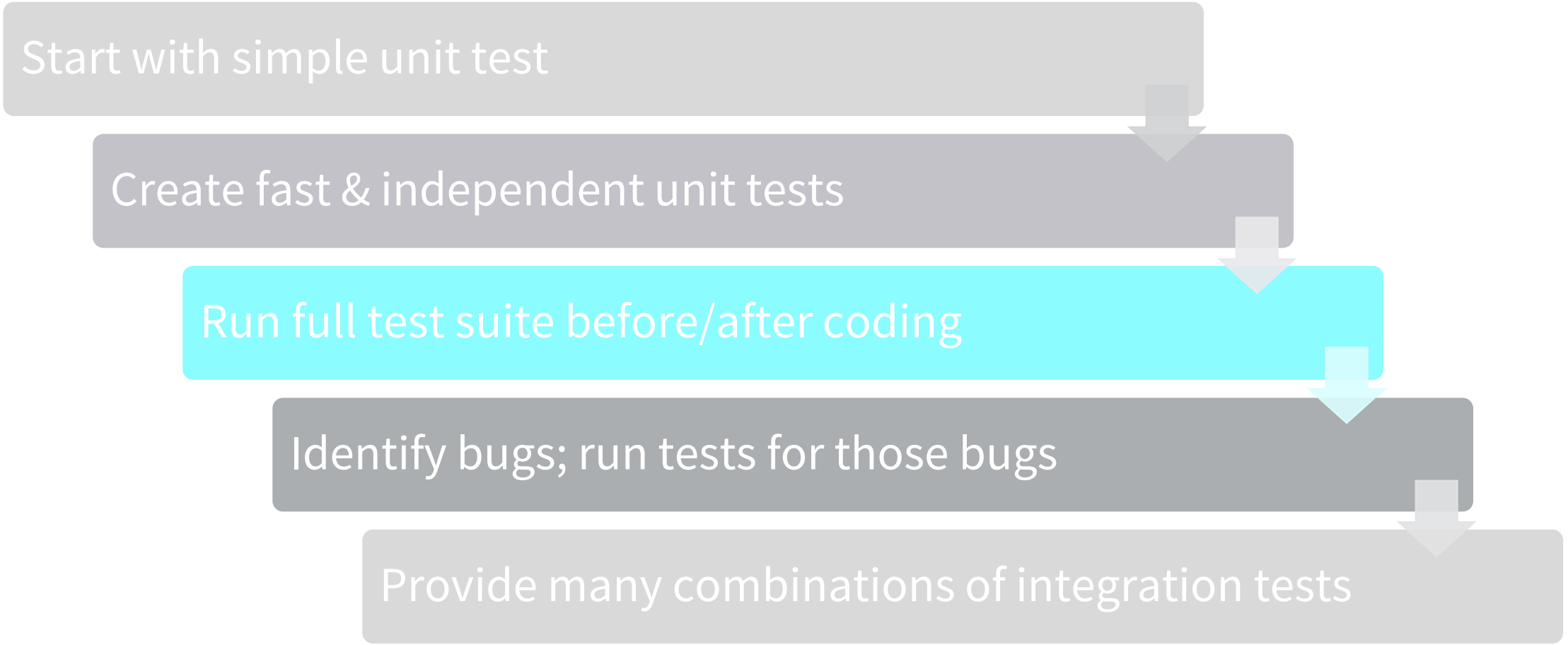
- Check functionality
- Isolate what's broken
- Fix problems faster

Integration test

- Check many functionalities
- Examine integration
- Identify multiple problems



UNIT AND INTEGRATION TESTING



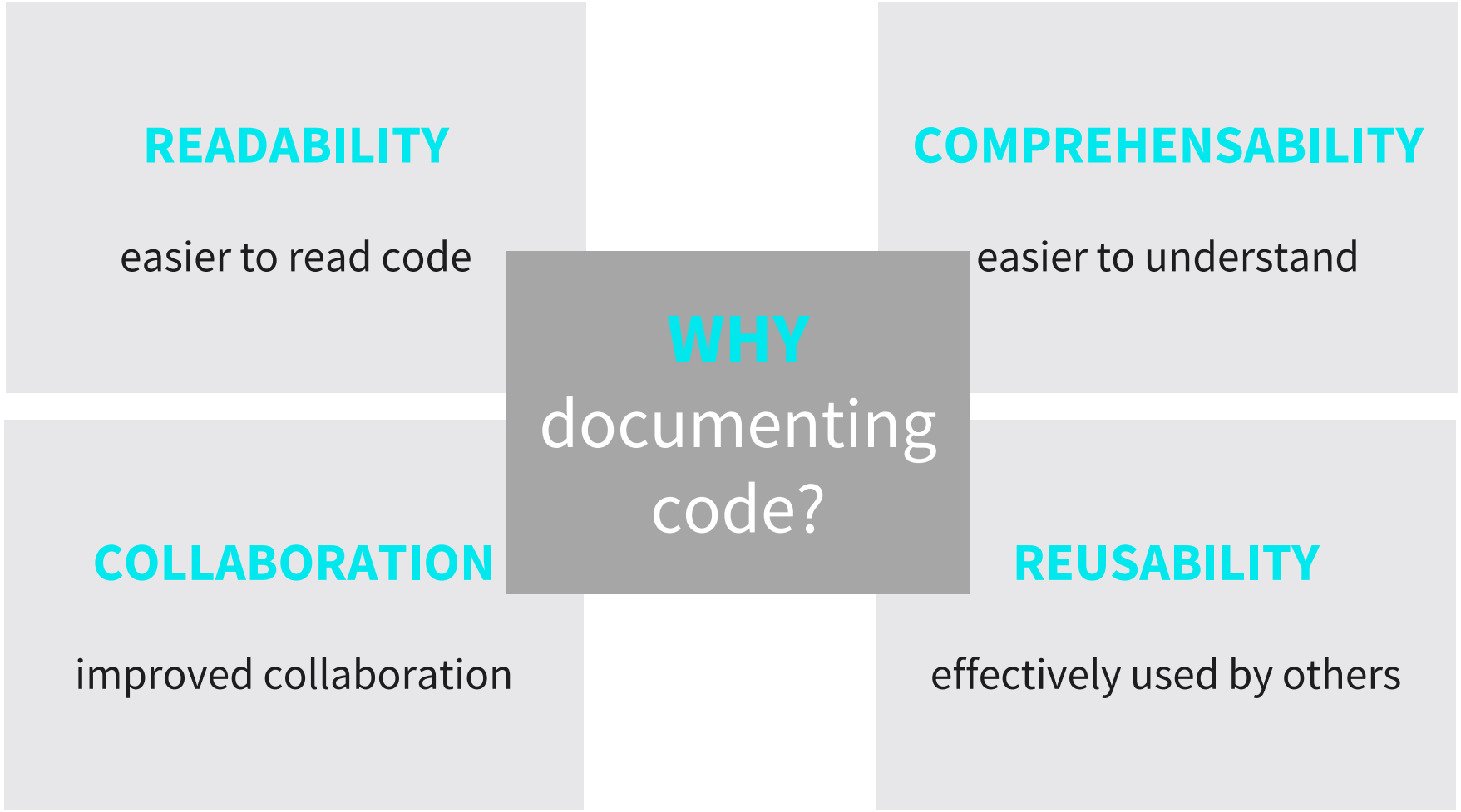
Source of the text: Fabrizio, 2018.

“unittest”: most popular testing framework

- Test automation, integration, independence and reporting

Method	Checks that
assertEqual(a, b)	a == b
assertTrue(a)	bool(a) is True
assertIs(a, b)	a is b
assertIn(a, b)	a in b
assertIsInstance(a, b)	isinstance(a, b)

More information: https://docs.python.org/3/library/unittest.html



More information: https://peps.python.org/pep-0008

DOCUMENTING CODE

Block comments `# Example`

- Apply to all code that follows

Inline comments `# Example`

- Write on top or same line as a statement

Documentation strings `''' Example '''`

- Docstrings used as the first statement in a module, class or method definition

Source of the text: Kapil, 2019.

REVIEW STUDY GOALS

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UNIT 5

TRANSFER TASK

TRANSFER TASK

Case Study: Unit Test versus Integration Test

READ Research literature regarding “unit test” and “integration test”

IDENTIFY Identify common characteristics and highlight distinctive features

EXPLAIN Provide examples to support your claims

DISCUSS Discuss your findings and compare them with the other groups

TRANSFER TASK
PRESENTATION OF RESULTS

Please present your results.

The results will be discussed in plenary.

1. Virtual environments are created to manage…
   a) … separate environments with different versions of Python and its libraries
   b) … unique environments with the same versions of Python and its libraries
   c) … separate environments with the same versions of Python and its libraries
   d) … separate environments with one version of Python and its libraries

2. The two most common types of functional program testing used today are…
   a) … program and interactive tests
   b) … system and integration tests
   c) … unit and integration tests
   d) … system and unit tests

3. Define “conda” as a setup tool to manage Python Virtual Environments. Conda is …
   a) Conda is the main package used with command lines at the DOS prompt for Windows, or in a terminal window for macOS or Linux
   b) Conda is the main package used with command lines at the Anaconda prompt for Windows only
   c) Conda is the main package used with command lines in a terminal window for macOS or Linux only
   d) Conda is the main package used with command lines at the Anaconda prompt for Windows, or in a terminal window for macOS or Linux

LIST OF SOURCES

Kapil, S. (2019). *Clean Python: Elegant coding in python.* Apress.
Fabrizio, R. (2018). *Learn python programming*. Packt Publishing.