VIETNAM NATIONAL UNIVERSITY

UNIVERSITY OF SCIENCE

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**A blue and white logo

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**COMPUTER NETWORKING**

**Remote PC Control via Email**

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# Introduction

## Intent

The intent behind the "Remote PC Control via Email" project is to revolutionize the way computer systems are managed remotely. This initiative is driven by the goal of providing users with a secure, convenient, and efficient means of controlling a computer from a distance using the familiar medium of email. By leveraging this ubiquitous communication tool, the project aims to enhance accessibility and streamline operations in the realm of remote computer management.

## Motivation

With the above intent, our group’ s motivation is optimizing the user experience by offering specific functions that cater to commonly remote management needs, such as screenshot capture or webcam control. Beyond that, we also want to provide users with easy and direct access to essential functions through email commands. This approach ensures that users, regardless of their technical proficiency, can effortlessly interact with the system and initiate commands without the need for extensive training or complex procedures. Besides, to ensure that users, regardless of their technical background, can comfortably engage with the system, our goal is creating a user-friendly interface that users can interact daily, make users more comfortable while utilizing our product.

# Code presentation

## Mail relating section.

### Class: Mail

* Variable within class object:
  + **sender**: a string to store the sender's email address.
  + **cmd\_list**: a list storing the command data extracted from a received email.
  + **attachment**: a string to store the path of the return file (in case there is one)
  + **body**: a string to prepare the answer for the email sent back to the requester.
  + **subject**: a fixed string of the email title.
  + **email\_message**: a MIMEMultipart object to compress the email content that will be sent.
* Member functions of the mail class:
  + The `**fetch\_mail**` function is designed to retrieve unread emails from a Gmail inbox with the subject "Mail Control". It logs into the mail server, selects the inbox, searches for unread emails with the specified subject, and processes each email to extract the sender and a command list using the `**decode\_mail**` function.
  + The `**send\_mail**` function is designed to send an email using the SMTP protocol via the Gmail SMTP server (*smtp.gmail.com*). It establishes a connection, logs in using predefined global constants (*USERNAME* and *APP\_PASS*), sends an email to a specified recipient (sender), and prints a message indicating the successful mailing operation.
  + The `**screenshot**` function captures a screenshot of the user's PC, attaches it to an email, and populates the email message with relevant information. The function utilizes an external function, `**capture\_SS**`, to obtain the screenshot file path. It also incorporates auxiliary functions, **current\_time**, and **set\_info**, to include a timestamp and set additional information in the email.
  + The **webcam** function captures an image using the computer's webcam, attaches it to an email, and sets up the email message with relevant information. The function utilizes an external function, **capture\_webcam**, to obtain the webcam capture details. It also includes auxiliary functions, such as **set\_info**, to configure the email subject and additional information.
  + The **keylogger** function initiates a keylogging operation, configures email information, and prepares an email with details about the keylogging duration. Leveraging the external function **key\_logger**, it captures the keylogger log file path and the specified duration for keystroke recording. Additionally, the function incorporates **set\_info** to establish the email subject and initialize the email message object. The resulting email body contains information about the program recording keystrokes for a specific duration. The keylogger file is attached to the email for the sender's retrieval.
  + The **logout** function composes an email body indicating that the user has been logged out of their PC and attaches this message to the email. The function utilizes the **send\_mail** method to send the email, notifying the sender of the logout forward. Subsequently, the function employs the *os.system("shutdown -l")* command to initiate a system logout.
  + Similarly, the shutdown function composes an email body indicating the imminent shutdown of the user's PC and then notifying the sender of the impending shutdown via email. The function proceeds to execute a countdown, displaying the remaining seconds until shutdown in the console. Finally, it initiates a system shutdown using the *os.system("shutdown /s /t now")* command.
  + The **list\_app** function retrieves the list of currently running applications on the user's PC using the **list\_running\_application** function. Then the **set\_info** support function is called to set additional information. The running applications list is attached as a text file named *"RunningApplications.txt"* to the email for the sender's reference.
  + The **terminate\_process** function attempts to terminate a specified process using the **kill\_process** function. It configures email information with the subject "Terminate Process" and attaches a message to the email. If an IndexError occurs, indicating a missing argument, it sets the email subject as "Terminate Process Failed" and appends an error message to the email body.
  + The **send\_log** function facilitates the sending of the program's log file via email. It configures the email subject as "Log File," with an attachment named "*mail.log*". The primary purpose is to provide the sender access to the program's log information for review.
  + The **process\_command** method interprets and executes commands received from email messages. It sets up email information and performs corresponding actions based on a predefined dictionary of commands. Error handling is implemented to capture exceptions during command execution, and an error message is appended to the email body in case of failure. If no valid commands are detected, an error message is set, and the **help** method is invoked to provide a list of available commands.
  + The **run** method serves as the main operational loop of the Mail class. It periodically fetches new emails, processes commands if any are detected, and displays relevant information.

### Utility functions:

* + The **decode\_mail** function processes an email message, extracting information such as the sender's email address and command list from the email body.
  + The **check\_ext** function verifies the extension of a given file name in picture format. If not satisfied, the PNG extension is assigned to it automatically.
  + The **capture\_SS** function utilizes the *ImageGrab.grab()* from the Python Imaging Library (PIL) to capture the current screen.
  + Similarly, the **capture\_webcam** function, with the support method from the CV2 library, allows the program to grab a webcam image.
  + The **key\_logger** function sets up a logger using the Python logging module, specifying the log format and file handler. Utilizes the pynput library's Listener to start capturing keystrokes. The logger captures each keystroke and logs it to the file.
  + The **note2log** function records any instance of commands received from email and stores it inside a file named “*mail.log”*
  + The **list\_running\_application** function generates a list of currently running applications on the system using PowerShell. It executes a PowerShell script through the subprocess module, captures the output, and writes the list to a file named *“Applications.txt”* in the "Files" directory. The function then returns the file path.
  + The **list\_running\_process** function generates a list of currently running processes on the system using the "tasklist" command. It executes the command through the *os.popen*, processes the output to remove unnecessary information, and writes the list to a file named “*Processes.txt*” in the "Files" directory. The function then returns the file path.
  + The **kill\_process** function terminates a running process on the system based on the provided data. It accepts either a process ID (PID) or a process name, constructs the appropriate termination command using the "*taskkill*" utility, executes the command in cmd using the *os.open* command, and then returns the state whether successful or not.

## GUI relating section.

### Class: App

* Collect data from emails for Mail\_page class.
* Create objects to be printed on the screen.

### Class: Mail\_page

* Creating Widgets.

### Class: Widget

* The mail's main viewing page.

### Class: Popup

* The preview mode for attachment files.

Create a small window representing content depending on the attachment extension.

If the extension type is

* **Picture file** (“png”, “jpg, “tiff”, "bmp"): It will paste that picture into the pop-up.
* **Text file** (“txt” or "log”): It will read and paste all the content into the pop-up.

# Application interface and usage

## How to run

* Locate the main file in the `*Source*` folder.
* Run the command: `python main.py`

A screenshot of a computer

Description automatically generatedThen a new window will pop up as follows:

## Composing mail

Use any of the mailing services to send an email to our application with the **format**:

A screenshot of a computer

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**To:** [emailcontrolmmt@gmail.com](mailto:emailcontrolmmt@gmail.com)

**Subject:** Mail Control

**Body:**

[Command 1]

[Command 2]

…

[Command n]

**Command list:**

* screenshot [file name]
* webcam [file name]
* keylog [time in seconds]
* logout
* shutdown [time in seconds]
* listApp
* listProcess
* terminateProcess [PID/Process Name]
* log
* help

If any commands are not in the command list, the help command will be called.

***Note:*** please replace the content inside [] for additional personalization.

## Command usage

### *screenshot [file name]*

Capture a screenshot of the screen and save it.

The ***default name*** will be **‘Screenshot.png’** if not given by the user.

*Path:* “Files/Pictures/**Screenshot.png**”.

### *webcam [file name]*

Similarly, this command will use the computer webcam to catch a picture.

The default file name is **‘Webcam.png’** if not included.

*Path:* “Files/Pictures/**file\_name.png**”.

### *keylog [time in seconds]*

The application will trace the user typing from the keyboard for a set period.

*Path:* “Files/**Keylog.txt**”.

**Default timer:** 5 seconds.

### *logout*

Log out the account of the computer.

### *shutdown [time in seconds]*

The computer will be shut down after some time.

**Default timer:** 10 seconds.

### *listApp*

Use the window command to list all running applications.

*Path:* “File/**Applications.txt**”

### *listProcess*

Use the window command to write down all running processes.

Path: “Files/**Processes.txt**”

### *terminateProcess [PID/Process Name]*

Terminate a process using **PID** or **Process Name.**

Must pass **PID/Process Name**

*Error handling*

* Missing argument: “ERROR: Terminate process command misses an argument.”
* Cannot be terminated: “ERROR: The process with **PID/Process Name** could not be terminated.”
* Not found process: “ERROR: The process **PID/Process Name** not found.”

### *log*

Record all received emails and commands.

*Path:* “Files/**mail.log**”

**Format:**

Time: DD MM YYYY HH:MM:SS

From: sender email

Content: all commands in a mail

Reply:

Attachment: files’ path

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### *Help*

List of all supported commands.

*Path***:** “Files/**help.txt**”

## App presentation

An object is created when receiving any mail.

A screenshot of a video game

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**Format:**

Sender Email | Commands | Date

**Click on the event:** go into mail viewing mode.

A screenshot of a computer

Description automatically generated

**Home button:** return to Mail page.

**Sender mail zone:**

* Email: Sender email | Time
* Content: All commands in mail

**Reply zone:**

* From: Server email
* Content: (Error if existed)
* Attachment: content in path (if any)

# Video Demonstration and Enhancement

## Demo

Video demo: <https://www.youtube.com/watch?v=Doc2UtP7quE>

Our GitHub repository: <https://github.com/Melios22/PC_Controller_via_Mail.git>

## Further optimization

Some enhancements can be applied to further optimize our application.

* A password should be sent alongside the email so that the system can verify the authentication.
* When launching the application, we should log in to the system ourselves rather than let the code use the created constant variables.
* Save sent emails to files or some databases so that the system can load back the previous emails.
* Use multi-thread to fetch emails and load them to the application screen without noticeable impact.
* Further enhance the user interface to be more informative.

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