Addis Ababa Institute Of Technology

School of Information Technology and Scientific Computing

Course: Fundamentals of IT Security

Instructor: Mr. Abebe

Topic: Implement a Keylogger in two different languages and report on their complexities

Section: 2 / Regular

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KeyLogger Complexities Report

Java

Implementation: This version of keylogger implemented using three threads working at the same time to log Keyboard events, Mouse events and Screenshots. Both Keyboard and Mouse Threads implement a listener that logs based on events that correspond to their behaviour. It also uses a Sync object to allow inter-thread communication for synchronization purposes. If the purpose is to log events on any operating system that runs Java, this is the preferred implementation.
Time Complexity: Since Time Complexity is a theoretical estimation of an algorithm, using threads will not affect the overall time complexity. Threads can only improve execution time. Lets break those three threads down.

- For Screen Capture Thread: O(60) is the worst time complexity. This is because it runs in a continuous loop which captures screenshots and saves them to disk every 60 iterations.
- For Keyboard Logger Thread: O(1) is the worst time complexity. This is because it captures and logs events every single time a keyboard key is pressed or released.
- For Mouse Logger Thread: O(1) is the worst time complexity. This is because it captures and logs events every single time a mouse key is moved or pressed.

Space Complexity: Since Space Complexity is a theoretical estimation of an algorithm, using threads will not affect the overall space complexity. Lets break those three threads down.

- For Screen Capture Thread: O(Screenshot Size) is the worst space complexity. This is the size of the image captured before it's written into a file and discarded.
- For Keyboard Logger Thread: O(1) is the worst space complexity. This is because it captures and logs events every single time a keyboard key is pressed or released.
- For Mouse Logger Thread: O(1) is the worst space complexity. This is because it captures and logs events every single time a mouse key is moved, pressed or released.

Python

Implementation: This version of keylogger implemented using a listener responds to any keyboard event to log pressed keys as well as take screenshots every few key presses. This is the preferred implementation for low size, quick and covert applications.
Time Complexity: Since the python version implements a listener which responds to any keyboard key input, O(1) is the worst case complexity there is. This is because the program logs every key pressed into a global temporary variable. This variable is then written into a file once it reaches a certain length(100) or when an 'Escape' key is pressed.
Space Complexity: O(100)+O(Screenshot Size) is the worst case complexity for this program. The O(100) corresponds to the global data variable where we collect our keyboard events. And the O(Screenshot Size) corresponds to the memory size of screenshot variable we take.