COSC 439: Operating Systems Project

Title: USB Drive Encryption Device Driver for Secure File Transfers

Objective: This project aims to develop a robust **device driver** that enhances data protection by automatically encrypting files when they are copied from a PC to a USB drive. Utilizing public key cryptography, the device driver will ensure that sensitive information remains confidential and secure during the transfer process.

Key Features to Implement:

1. **USB Detection:** The driver should detect when a specific USB flash drive is inserted into the system.
2. **Automatic Encryption:** Files copied from the PC to the USB drive will be encrypted using a hard-coded public key.
3. **Secure Decryption:** When files are copied back to the PC, the driver will prompt for a private key, provided via a file, to decrypt the content.

Requirements:

1. **Progress Report:** Submit a progress report outlining encountered challenges, how you have solved them, the current status, and forthcoming steps. Upon submission, feedback will be given for project adjustment based on the provided feedback. **(1 pt)**
2. **Code Implementation:** Implement automatic file encryption using a public key when copying to the USB drive, and prompt for a private key to decrypt files copied back to the PC (**6 pts**).
3. **Technical Report:** Prepare a detailed report that includes **(5 pts)**:
    - **Introduction**: Define the project objectives, importance of access control, and scope of the device driver.
    - **Features Description**: Detail each implemented feature and its significance in securing files using a USB flash drive.
    - **Implementation Details**: Present technical insights into the development of the device driver. Discuss challenges faced and significant decisions made during the development process.
    - **Results Analysis**: Showcase outcomes of the encryption, decryption, and access control features.
    - **Conclusion**: Summarize key findings and the impact of the project on securing sensitive data.
4. **Presentation:** In person presentation that focuses on the technical aspects of the project. Utilize PowerPoint slides to highlight project goals, algorithms employed, implementation details, evaluations, challenges encountered, and insights gained. Additionally, ensure the presentation includes a live demonstration of the project to provide a practical illustration of its functionality. **(5 pts)**
5. **Retrospective and Contribution Report:** Reflect on the Operating Systems (OS) course, summarizing significant lessons learned, their practical relevance, and their impact on understanding OS principles. Additionally, list your own contributions as well as those of your teammates towards the project. **(1 pt)**

Deadlines:

- **Progress Report:** November 17, 2025
- **Presentation and Demo:** December 3–8, 2025 (In person)
    - Presentations will take place in the professor's office (YR 456) or in the library (YR 454).
    - Each group will present together, and all group members must be present.
    - The professor may ask questions or request modifications to the project or source code to verify that the work was done by the students and not generated by GenAI or copied from online sources.
    - Time slots will be provided via Calendly, and students should book a slot according to their convenience.
- **Source Code Submission:** December 8, 2025
- **Technical Report:** December 11, 2025
- **Retrospective and Contribution Report:** December 11, 2025