Project Submission

1) Tentative Title of the Project

File System Benchmarking & Performance Study: Evaluating NTFS, EXT4, APFS, and FAT32 for Cybersecurity and Forensic Applications

2) Scope of the Project

This project focuses on conducting a **comparative performance and forensic analysis** of widely used file systems — **NTFS, EXT4, APFS, and FAT32**. The study addresses the problem of selecting the most appropriate file system for different organizational needs, particularly in environments that demand **data security, reliability, and performance**.

- Benchmarking read/write performance on both large and small files to evaluate efficiency across different workloads.
- Documenting metadata handling, including timestamps, access control attributes, and journaling, to assess forensic and compliance implications.
- Analyzing trade-offs between file systems in contexts such as high-performance databases, enterprise environments, and personal data storage.
- Developing reproducible benchmarking scripts using Bash, PowerShell, and Python to ensure cross-platform compatibility (Windows, Linux, macOS).
- Generating data visualizations and charts to clearly present performance metrics and findings.
- Delivering a structured final report and presentation, including best practices and recommendations for selecting file systems that balance performance, scalability, security, and disaster recovery resilience.

This research-driven project not only benchmarks technical performance but also evaluates **cybersecurity and forensic aspects**, focusing on how metadata reliability, tamper resistance, and recovery mechanisms impact real-world use cases.

3) Group Members

- Siva Shankar Reddy Beeram
- Ammy Gwaba
- Avipsa Sharma Paudel