CS330-Sp'25 BESE-14 2K23
Project Report Rubrics

The objective is to **understand** the architecture and responsibilities of the assigned operating system (OS) module such as Process Management or FileHandling etc., **explain** how it functions across four major distributions: Ubuntu, RedHat, Android, and Debian. This involves a thorough **analysis** of how the module **interacts** with other core components of the OS, such as memory management, I/O systems, and user interfaces, while also examining the **impact** of cross-platform differences in implementation and performance. A critical part of the study is to **evaluate** potential security risks and known vulnerabilities associated with the module, and to **propose** effective mitigation strategies that ensure robust and secure operation across all platforms. Further, based on user feedback, observed performance metrics, and security audits, specific **improvements** to the module will be **proposed** with the aim of enhancing both efficiency and reliability. To support the development of the new PAK OS, the project will also **document** the history, evolution, and notable bug fixes associated with the module, thereby **contributing** to a deeper understanding of its development lifecycle and future potential. Each stage of this investigation aligns with the cognitive levels of Bloom's Taxonomy, including **remembering** historical facts, **understanding** module functionality, **applying** knowledge across platforms, **analysing** inter-component relationships, **evaluating** security threats, and **creating** improved module designs.

Note: Please ensure that you conduct research using authentic sources and include all reference links and reliable open-source information related to your assigned module. At the beginning of the report, clearly define the division of research tasks among all group members.

Deliverables:

Section A: Understanding & Analysis

1. **Explain** the scope of your project section as you presented it in your presentation, and include any modifications recommended by the faculty members.
2. **Explain** the key responsibilities of each module you have been assigned.
    (Hint: Process Management, File System, etc. Describe how it works in Ubuntu, RedHat, Android and Debian.*)*
3. **Identify** any critical dependencies or cross-module interactions your module has.

4. **Summarize** the stakeholder requirements for your module developers, admins, end-users
    Include key concerns like security, ease of use, or performance.

Section B: Cross-Platform Design, Application & Implementation Strategies

1. **Analyze scenarios where your assigned module behaves differently across multiple distributions Ubuntu, RedHat, Android and Debian.**

   Discuss *why* such differences exist design philosophy, target users, hardware architecture, etc.

   Include architectural or API-level differences if applicable

2. **Evaluate how your module is implemented on different device categories.**
3. **Provide a detailed comparison highlighting the differences between Ubuntu, Android, RedHat, and Debian implementations, focusing on performance, security, compatibility, and usability.**

Section C: Security & Risk Mitigation

1.Analyze the attack surfaces and potential vulnerabilities in your module.
(e.g., buffer overflow in drivers, privilege escalation in scheduler, unauthorized API access)

2.Evaluate possible security mechanisms that can be embedded in your module.
(Examples: sandboxing, ACLs, process isolation, encrypted communication)

3.Propose fallback mechanisms and recovery strategies in case of module failure.
(What happens if your file system or bootloader fails or UI crashes?)

Section D: Module Evolution, Feature Integration & Bug Analysis

1. Trace the historical evolution of your assigned module from its initial version to its current implementation across at least two operating systems (e.g., Ubuntu, Android, Fedora).

- Highlight major version upgrades
- Feature deprecations and new additions
- Performance improvements or regressions
- Design decisions that were changed or retained

2. Analyze the most commonly requested features by users/developers for your module.

- Gather insights from forums, bug trackers (e.g., GitHub, Stack Overflow, Launchpad)
- Prioritize features based on usability, stability, and scalability
- Match those to your module and suggest how to integrate them

3. Suggest your module's next version that addresses:

- At least **5 user-required improvements**
- At least 5 **performance optimizations**
- At least 5 **UX enhancement** *(if applicable)*
- 3 *developer/API-oriented upgrade*
  Include architecture or API modifications where relevant.

4. Document and categorize historical bugs or vulnerabilities associated with your module in past Versions. For each:

- Identify the root cause
- Explain how it affected performance/security

- Propose a permanent fix or patch strategy
- List tools you would use to detect such bugs early

Section E: Recommendation and Ranking of Linux Distributions for PAK OS Development

Based on your analysis of the four distributions Ubuntu, Android, Debian, and RedHat **recommend the two most suitable distributions** for the development of the new PAK OS. **Rank your choices as 1st and 2nd** and provide detailed reasoning for your selections.

In your response, apply higher-order thinking skills by:

- **Evaluating** the strengths and weaknesses of each distribution in relation to the chosen OS module.
- **Justifying** your recommendations with evidence and logical arguments.
- **Creating** a ranked list based on your critical assessment.