1   Lab 2A: Minimal Debugger

Week 2 Marks: 10

1.1   Problem Statement

Implement a minimal debugger for ELF binaries that can load, control, inspect, and step through processes using OS-level debugging primitives. The debugger must not rely on GDB or other external tools.

1.2   Functional Requirements (Mandatory)

1. Load and execute a target binary

2. Set and remove software breakpoints

3. Single-step and continue execution

4. Inspect CPU registers at breakpoints

5. Display process status

1.3   Non-Functional Requirements

- Must use `ptrace`

- Must not corrupt debuggee state

- Graceful error handling

1.4   Optional Extensions

DWARF-based symbol lookup, shell integration, memory inspection.

1.5   Deliverables

Debugger, Makefile, user guide, technical report (3–4 pages), tests, demo.