Software Testing Assignment Phase A & Phase B Report

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1 Phase A: Structural Analysis (White-Box Testing)

1.1 Cyclomatic Complexity: Pagination Feature

1.1.1 Control Flow Graph (CFG)

Figure 1 shows the Control Flow Graph (CFG) for the pagination logic implemented in the system.
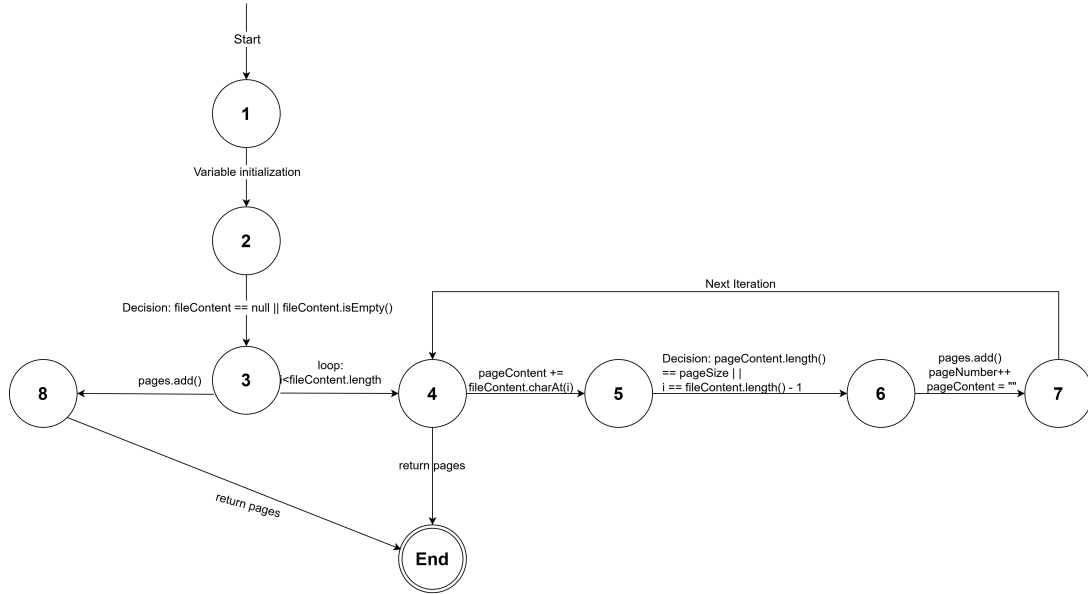

Figure 1: CFG for Pagination Logic

1.1.2 Cyclomatic Complexity Calculation

Cyclomatic Complexity is calculated using the formula:

$$V(G) = E - N + 2P$$

Where:

- E = Number of edges = 11

- N = Number of nodes = 10

- P = Number of connected components = 1

$$V(G) = 11 - 10 + 2(1) = 3$$

Therefore, the cyclomatic complexity of the Pagination logic is:

$$\boxed{V(G) = 3}$$

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1.1.3 Independent Paths

The set of independent execution paths is defined as:

$$P = \{p_1, p_2, p_3\}$$

$$p_1 = \langle Start, 1, 2, 3, 8, End \rangle$$

$$p_2 = \langle Start, 1, 2, 3, 4, End \rangle$$

$$p_3 = \langle Start, 1, 2, 3, 4, 5, 6, 7, 4, End \rangle$$

These paths ensure that all decision points and loop behavior in the pagination logic are exercised at least once.

1.2 Cyclomatic Complexity: Auto-Save Feature

1.2.1 Control Flow Graph (CFG)

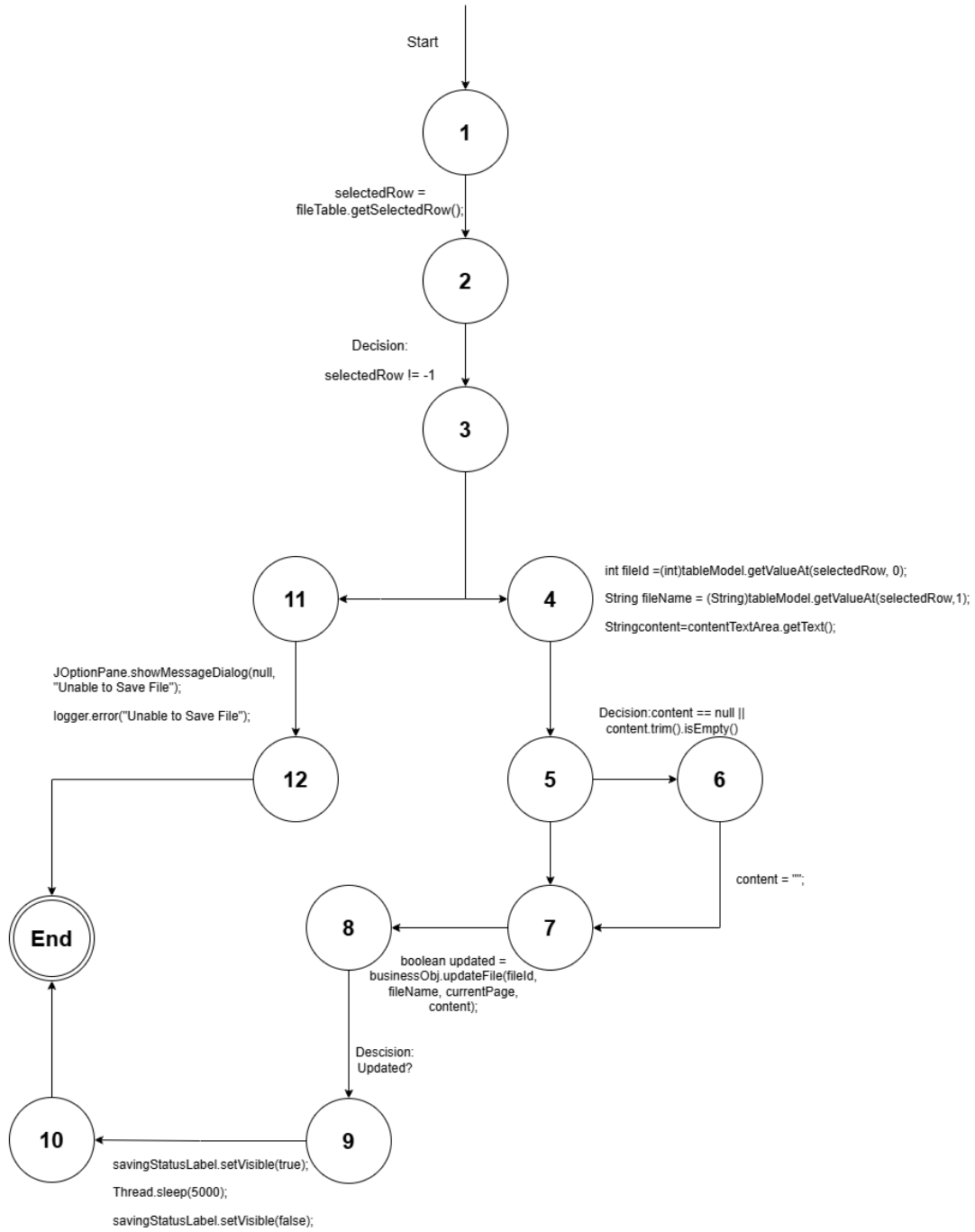Figure 2 illustrates the Control Flow Graph (CFG) for the Auto-Save logic.

Figure 2: CFG for Auto-Save Logic

1.2.2 Cyclomatic Complexity Calculation

Cyclomatic Complexity is computed using the formula:

$$V(G) = E - N + 2P$$

Where:

- E = Number of edges = 15

- N = Number of nodes = 14

- P = Number of connected components = 1

$$V(G) = 15 - 14 + 2(1) = 3$$

Therefore, the cyclomatic complexity of the Auto-Save logic is:

$$\boxed{V(G) = 3}$$

1.2.3 Independent Paths

The set of independent execution paths for the Auto-Save logic is:

$$P = \{p_1, p_2, p_3\}$$

$$p_1 = \langle Start, 1, 2, 3, 11, 12, End \rangle$$

$$p_2 = \langle Start, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, End \rangle$$

$$p_3 = \langle Start, 1, 2, 3, 4, 5, 7, 8, 9, 10, End \rangle$$

These independent paths ensure coverage of error handling, empty-content handling, and normal auto-save execution flows.