Theory Assignment Report

Only for course Teacher						
		Needs Improvement	Developing	Sufficient	Above Average	Total Mark
Allocate mark & Percentage		25%	50%	75%	100%	5
Clarity	1					.5
Content Quality	2					1.5
Spelling & Grammar	1					.5
Organization and Formatting	1					.5
					Total obtained mark	3
Comments						

Semester: Fall 24

Student Name: Nur Ahmed

Student ID: 222-35-1111

Batch: 38 **Section:** A

Course Code: SE 312

Course Name: Software Quality Assurance & Testing

Course Teacher Name: Md. Suhag Ali

Designation: Lecturer

Submission Date: 08/12/2024

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The task

```c
#include <stdio.h>
#include <string.h>
int main() {
    const char correctUsername[] = "Admin";
    const char correctPassword[] = "abc123";
    char username[50];
    char password[50];
    int loginAttempt = 0;
    int loggedIn = 0;

    while (loginAttempt < 3 && !loggedIn) {
        printf("Enter User name: ");
        scanf("%49s", username);
        printf("Enter password: ");
        scanf("%49s", password);

        if (strcmp(username, correctUsername) == 0 && strcmp(password, correctPassword) == 0) {
            printf("Login successful!\n");
            loggedIn = 1;
        } else {
            printf("Incorrect User name or password. Please try again.\n");
            loginAttempt++;
        }
    }
    if (!loggedIn) {
        printf("You have been locked out due to too many failed login attempts.\n");
    }
    for (int i = 0; i < loginAttempt; i++) {
        printf("Login attempt %d failed.\n", i + 1);
    }

    return 0;
}
```

1. **Calculate** Cyclomatic complexity of the program.
2. Apply different types of mutation testing to the code above

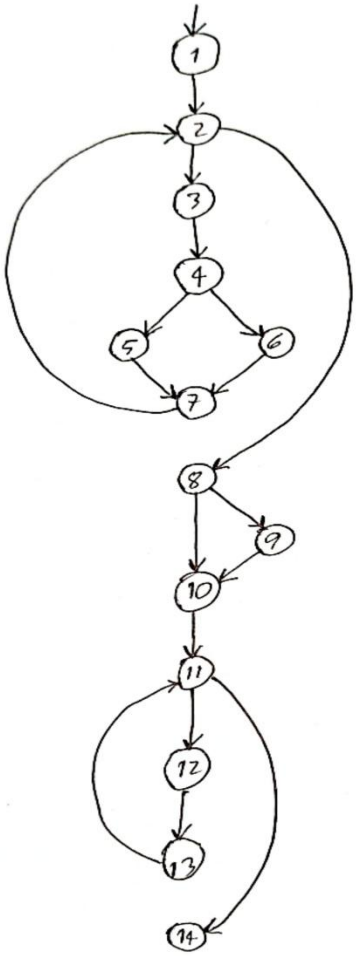
Solution 1

Identifying the nodes:

```
#include <stdio.h>
#include <string.h>
int main() {
    const char correctUsername[] = "Admin";
    const char correctPassword[] = "abc123";
    char username[50];
    char password[50];
    int loginAttempt = 0;
    int loggedIn = 0;

    while (loginAttempt < 3 && !loggedIn) {
        printf("Enter User name: ");
        scanf("%49s", username);
        printf("Enter password: ");
        scanf("%49s", password);

        if (strcmp(username, correctUsername) == 0 && strcmp(password, correctPassword) == 0) {
            printf("Login successful!\n");
            loggedIn = 1;
        } else {
            printf("Incorrect User name or password. Please try again.\n");
            loginAttempt++;
        }
    }
    if (!loggedIn) {
        printf("You have been locked out due to too many failed login attempts.\n");
    }
    for (int i = 0; i < loginAttempt; i++) {
        printf("Login attempt %d failed.\n", i + 1);
    }

    return 0;
}
```

1
2
3
4
5
6
7
8
9
10, 11, 12
13
14

Control Flow Graph (CFG) and Cyclomatic Complexity:



Cyclomatic Complexity = E - N + 2P

= 17 - 14 + 2 × 1

= 5

E = 17
N = 14
P = 1

Solution 2

Applying different types of Mutation Testing techniques: