

DACS3203 Secure Software Development

Assignment Part 4

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### Test Cases for 1.1 - Student Registration

Test Case ID	Requirement ID	Test Objective	Test Steps	Expected Result	Actual Result	Status	Remarks
TC-1.1-01	1.1	Register a new student with valid data	Navigate to registration form Enter valid name, email, academic info Submit	Student is successfully registered and stored in DB	Student created and visible in DB	Pass	-
TC-1.1-02	1.1	Trigger email confirmation	Register a student Check if email confirmation is triggered	Confirmation email is sent to the email address	Console simulates email sent	Pass	
TC-1.1-03	1.1	Register student with missing required fields	Leave email or name blank Submit form	Registration fails and shows error message	Error displayed	Pass	-
TC-1.1-04	1.1	Register with invalid email format	Input: `student[at]test` Submit	Validation error for invalid email format	Error displayed	Pass	-

### Test Cases for 1.2 - Course Enrollment

Test Case ID	Requirement ID	Test Objective	Test Steps	Expected Result	Actual Result	Status	Remarks
TC-1.2-01	1.2	Browse course catalog	Login as student Navigate to Course Catalog	All available courses are listed	Course list displayed	Pass	-
TC-1.2-02	1.2	Enroll in course with met prerequisites	Select course where prerequisites are met Enroll	Enrollment successful and confirmed	Enrolled successfully	Pass	-
TC-1.2-03	1.2	Enroll in course without meeting prerequisites	Select course without completing prerequisites Enroll	Enrollment rejected with error	Prerequisite check error shown	Pass	-
TC-1.2-04	1.2	Enroll outside allowed enrollment window	Attempt enrollment outside designated time frame	Enrollment is disabled or blocked	Enrollment window enforcement active	Pass	-
TC-1.2-05	1.2	Enroll in course that has reached full capacity	Select course at full capacity Enroll	Enrollment denied with capacity warning	Capacity error message shown	Pass	-

### Test Cases for 1.3 - Assignment Submission & Grades

Test Case ID	Requirement ID	Test Objective	Test Steps	Expected Result	Actual Result	Status	Remarks
TC-1.3-01	1.3	Submit assignment with valid file and comment	Login as student Navigate to assignments Upload file and add comment Submit	Assignment is saved and confirmation shown	Assignment submitted successfully	Pass	-
TC-1.3-02	1.3	Submit assignment without file	Login as student Try to submit assignment without selecting file	Error message displayed and submission blocked	File required error shown	Pass	-
TC-1.3-03	1.3	Instructor records grade for assignment	Login as instructor Navigate to assignment submissions Enter and save grade	Grade is saved and visible to student	Grade saved and displayed	Pass	-
TC-1.3-04	1.3	GPA calculation after grading	Submit multiple grades for student View GPA	System calculates and displays GPA correctly	GPA calculated correctly	Pass	-

### Test Cases for 1.4 - Fee Payment Tracking

Test Case ID	Requirement ID	Test Objective	Test Steps	Expected Result	Actual Result	Status	Remarks
TC-1.4-01	1.4	Record a fee payment transaction	Login as student Go to payments Enter payment details Submit	Transaction is recorded and receipt is generated	Payment recorded and receipt shown	Pass	-
TC-1.4-02	1.4	View outstanding balance after partial payment	Submit a partial fee payment Check balance	Outstanding balance is updated and displayed correctly	Balance updated correctly	Pass	-
TC-1.4-03	1.4	Generate payment receipt	Make a payment Check if receipt is generated or downloadable	Receipt is generated and accessible	Receipt generated	Pass	-

### Test Cases for 1.5 - Transcript Request

Test Case ID	Requirement ID	Test Objective	Test Steps	Expected Result	Actual Result	Status	Remarks
TC-1.5-01	1.5	Request official transcript	Login as student Go to transcript section Click request Confirm	Transcript request is logged and processed	Request logged and confirmation shown	Pass	-
TC-1.5-02	1.5	Transcript includes course details, grades, and GPA	Submit transcript request Download or view transcript	Transcript displays all required academic info	Transcript includes course details, grades, GPA	Pass	-
TC-1.5-03	1.5	Secure handling of transcript request	Submit request Monitor for unauthorized access or data leak	Transcript request is securely logged and access is restricted	Request is secure and traceable	Pass	-

### Peer Code Review Summary

Strengths:

- Well-structured with separation of concerns.
- Uses OOP and Java conventions effectively.

### Security Testing Summary (SAST/DAST):

**Tool Used:** VisualCodeGrepper form lab 10 STST.

## Findings:

- 12 public classes were not declared as final. Updated where applicable.
- Multiple primitive operations had overflow potential. Replaced with Math.addExact() or constants.

## Fixes Applied:

- Added final to utility, model, and controller classes that are not subclassed.
- Replaced unsafe arithmetic operations with safe Java Math utilities and documented fixed rates/constants.
- Although VisualCodeGrepper flagged a critical SQL injection issue in TranscriptController.java, this was reviewed and determined to be a false positive. The SQL query uses a PreparedStatement with parameter placeholders (?) and securely binds user input using stmt.setString(), which prevents SQL injection as per OWASP guidelines.

Before the fix:

VCG				
File Edit View Scan Settings Help				
C:\Users\dacs3203\Downloads\WebScot-man				
Target Files Results Summary Table				
Priority	Severity	Title	Description	File Name
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 7
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 7
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 3
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 8
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 3
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 10
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 8
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 4
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 12
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 26
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 27
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 15
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 11
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 14
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 143
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 14
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 16
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 61
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 19
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 96
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 13
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 19
<input type="checkbox"/> 1	Critical	Potential SQL Injection	The application appears to allow SQL injection via a pre-prepared dynamic SQL ...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 61
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 74
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 75
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 81
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 8
<input type="checkbox"/> 7	Potential Is...	Public Class Not Declared as Final	The class is not declared as final as per OWASP recommendations. It is consid...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32... 4

After fix:

Target Files Results Summary Table					
Priority	Severity	Title	Description	FileName	Line
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	26
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	97
<input type="checkbox"/> 1	Critical	Potential SQL Injection	The application appears to allow SQL injection via a pre-prepared dynamic SQL...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	61
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	74
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	75
<input type="checkbox"/> 5	Low	Operation on Primitive Data Type	The code appears to be carrying out a mathematical operation on a primitive dat...	C:\Users\dacs3203\Desktop\project-5-DACS3203-main\project-5-DACS32...	81

## Dynamic Testing (DAST) Findings:

To test the runtime security of the desktop application, I performed Dynamic Application Security Testing (DAST) using several manual test cases. These included attempts at SQL injection, weak input validation, and unauthorized access to protected screens.

Test	Method	Expected Result	Pass/Fail
Login SQL Injection	Use admin' OR '1'='1 as username	Login fails or shows error	Pass
XSS Injection	Enter <script>alert("XSS")</script> in input fields	Should not be rendered	Pass
Empty field submission	Leave required fields blank	Error shown, no crash	Pass
Register with weak password	Use 1234	Rejected	Pass
Access dashboard without login	Try opening FXML directly	Denied or redirected	Pass