

ACADBRIDGE: AN ACADEMIC RECORD SYSTEM WITH PERFORMANCE VISUALIZATION AND STRUCTURED COMMUNICATION AT GOA SCIENCE HIGH SCHOOL

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MAIN OBJECTIVE OF THE STUDY



Implement an academic record system with performance visualization and structured communication, designed to address the challenges of academic monitoring, data accessibility, and communication at Goa Science High School, while ensuring usability, efficiency, and user satisfaction in alignment with ISO 9241-11 standards.



SPECIFIC OBJECTIVES OF THE STUDY

1

Centralized
Database for
Academic
Records

2

Integrate Data
Visualization
Tools for Grade
Trends

3

Implement a
Messaging system
for Students and
Teachers

4

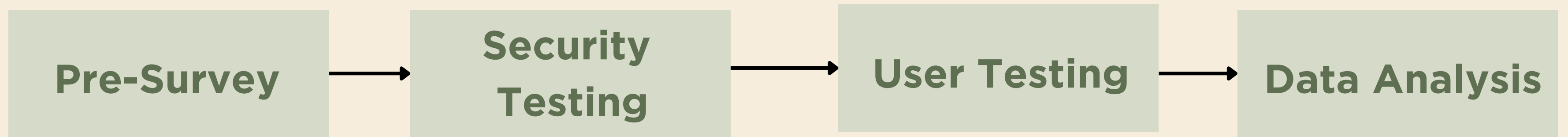
Design the system
in accordance to
ISO 9241-11
standards



METHODOLOGY



EVALUATION PROCESS



SECURITY TESTING

1. Authentication Testing
2. Authorization Testing
3. NoSQL Injection Prevention Testing
4. Input Validation Testing
5. Testing Tools and Environments

USER EVALUATION AND TESTING

TABLE I
USER TESTING TASKS BY ROLE

Role	Task ID	Task Description
Student	T1	View Grades - Specific Subject for a Specific Quarter
Student	T2	View if an Honor for a Specific Quarter
Student	T3	View Performance for All Subjects Across All Quarters (Highest/Lowest Overall)
Student	T4	View Performance for a Single Subject Across All Quarters (Highest/Lowest for Subject)
Student	T5	View Performance of All Subjects in a Single Quarter (Highest/Lowest for Quarter)
Student	T6	Message - Send a Text Message
Student	T7	Message - Send an Image message
Student	T8	Message - Send a text with an image message
Teacher	T1	Add and Remove Student To Class
Teacher	T2	View Section Grades
Teacher	T3	View Grade of A specific student
Teacher	T4	View Honors List
Teacher	T5	Download Section Grades
Teacher	T6	View grades of a specific class
Teacher	T7	Edit grades of a specific student in class
Teacher	T8	Download Template and input some grades and use upload grades feature
Teacher	T9	Download Current Class Grades
Teacher	T10	View Single Section Performance for all quarters
Teacher	T11	View Single Section Performance for a single quarter
Teacher	T12	View All Section Performance for all quarters
Teacher	T13	View All Section Performance for a single quarter
Teacher	T14	Send a text message
Teacher	T15	Send an image message
Teacher	T16	Send a text with image message
Admin	T1	Verify/Reject Account
Admin	T2	Add New Section
Admin	T3	Edit Section
Admin	T4	Delete Section
Admin	T5	Add Class
Admin	T6	Edit Class
Admin	T7	Delete Class
Admin	T8	View Grades of a Specific Class
Admin	T9	Edit Grades of a Specific Student in Class
Admin	T10	Download Template and input some grades and use upload grades feature
Admin	T11	Download Current Class Grades
Admin	T12	Update School Year
Admin	T13	Send a text message
Admin	T14	Send an image message
Admin	T15	Send a text with image message

USER EVALUATION AND TESTING

TABLE II
TASK INSTANCE OBSERVATION LOGS

Task ID	Trial No.	Assigned Participant	Task Success (Y/N)	Completion Time (min:sec)	Errors Encountered (Y/N/Details)
T#	Trial #	P#	Y/N	MM:SS	Y/N/Details of errors encountered during the task performance would go here. This column needs to wrap text properly.
...
T#	Trial #	P#	Y	01:30	N
T#	Trial #	P#	Y	02:15	Y/Clicked wrong button initially, then corrected.
T#	Trial #	P#	N	05:00	Could not find the download feature.

DATA ANALYSIS

1. Effectiveness Analysis
2. Efficiency Analysis (Time)
3. Efficiency Analysis (Errors)
4. Overall Satisfaction Analysis
5. Feature-Specific Satisfaction Analysis



RESULTS AND DISCUSSION

SECURITY TESTING

TABLE V
UNAUTHORIZED ACCESS TESTS

Test Case Description	Expected Behavior	Result
No cookie	Denied	Passed
Empty JWT cookie	Denied	Passed
Expired token	Denied	Passed
Malformed token	Denied	Passed
Tampered token	Denied	Passed
Token with fake user ID	Denied	Passed
Wrong cookie name	Denied	Passed

TABLE VI
ACCOUNT STATUS RESTRICTION TESTS

User Type	Route	Access Result
Pending User	/api/auth/check	Allowed
Pending User	/api/auth/logout	Allowed
Rejected User	/api/auth/check	Allowed
Rejected User	/api/auth/logout	Allowed
Pending User	Restricted routes	Denied
Rejected User	Restricted routes	Denied
Verified User	Restricted routes	Allowed

TABLE VII
ROLE-BASED ACCESS CONTROL TESTS

Scenario	Role	Access Result
Admin accessing admin route	Admin	Passed
Admin accessing student route	Admin	Passed
Admin accessing teacher route	Admin	Passed
Teacher accessing admin route	Teacher	Denied
Teacher accessing student route	Teacher	Denied
Teacher accessing teacher route	Teacher	Passed
Student accessing admin route	Student	Denied
Student accessing student route	Student	Passed
Student accessing teacher route	Student	Denied

SECURITY TESTING

TABLE VIII
MONGODB SANITIZATION MIDDLEWARE TESTS

Endpoint	Test Scenario Description	Sanitization Result
Login	Normal login (with/without sanitization)	Passed
Login	NoSQL injection with \$ne, \$gt, \$where	Blocked
Protected update	Normal update with sanitization	Passed
Protected update	Injection in contact number/address	Blocked
Signup	Normal signup attempt	Passed
Signup	Injection in email and \$where operator	Blocked

TABLE IX
INPUT VALIDATION MIDDLEWARE TESTS

Endpoint Type	Test Case Description	Result
Auth Endpoint	Missing required fields	Passed
	Invalid email format	Passed
	Invalid role	Passed
	Password too short	Passed
	Invalid image format	Passed
Student Endpoint	Missing school year	Passed
	Invalid school year format	Passed
	Missing required parameters	Passed
	Invalid data type	Passed
	Missing required quarter	Passed
Teacher Endpoint	Missing required parameters	Passed
	Invalid grade level	Passed
	Missing student IDs	Passed
	Invalid grading period	Passed
	Invalid class ID format	Passed
Class Endpoint	Missing required fields	Passed
	Invalid section IDs	Passed
	Invalid grade level	Passed

USER EVALUATION AND TESTING

TABLE X
TASK EFFECTIVENESS (SUCCESS RATE)

Task ID	Role	Success Rate (%)	Target Met
T1	Student	100.0	Yes
T2	Student	100.0	Yes
T3	Student	100.0	Yes
T4	Student	100.0	Yes
T5	Student	100.0	Yes
T6	Student	100.0	Yes
T7	Student	100.0	Yes
T8	Student	100.0	Yes
T1	Teacher	100.0	Yes
T2	Teacher	100.0	Yes
T3	Teacher	100.0	Yes
T4	Teacher	100.0	Yes
T5	Teacher	100.0	Yes
T6	Teacher	100.0	Yes
T7	Teacher	100.0	Yes
T8	Teacher	100.0	Yes
T9	Teacher	100.0	Yes
T10	Teacher	100.0	Yes
T11	Teacher	100.0	Yes
T12	Teacher	100.0	Yes
T13	Teacher	100.0	Yes
T14	Teacher	100.0	Yes
T15	Teacher	100.0	Yes
T16	Teacher	100.0	Yes
T1	Admin	100.0	Yes
T2	Admin	100.0	Yes
T3	Admin	100.0	Yes
T4	Admin	100.0	Yes
T5	Admin	100.0	Yes
T6	Admin	100.0	Yes
T7	Admin	100.0	Yes
T8	Admin	100.0	Yes
T9	Admin	100.0	Yes
T10	Admin	100.0	Yes
T11	Admin	100.0	Yes
T12	Admin	100.0	Yes
T13	Admin	100.0	Yes
T14	Admin	100.0	Yes
T15	Admin	100.0	Yes

USER EVALUATION AND TESTING

TABLE XI
TASK EFFICIENCY (TIME VARIABILITY)

Task ID	Role	Avg Time (s)	Std Dev (s)	CV	Target Met (CV <0.33)
T1	Student	9.377	0.465	0.050	True
T2	Student	8.270	0.403	0.049	True
T3	Student	15.743	1.913	0.122	True
T4	Student	12.670	1.822	0.144	True
T5	Student	15.740	0.583	0.038	True
T6	Student	8.053	1.644	0.204	True
T7	Student	7.040	1.399	0.199	True
T8	Student	7.633	0.690	0.090	True
T1	Teacher	12.817	1.158	0.090	True
T2	Teacher	9.560	0.655	0.069	True
T3	Teacher	9.750	1.676	0.172	True
T4	Teacher	9.567	0.804	0.084	True
T5	Teacher	16.583	1.407	0.085	True
T6	Teacher	9.517	1.467	0.154	True
T7	Teacher	14.817	5.566	0.376	False
T8	Teacher	17.950	1.226	0.068	True
T9	Teacher	17.417	2.377	0.136	True
T10	Teacher	17.567	0.535	0.030	True
T11	Teacher	16.517	1.497	0.091	True
T12	Teacher	13.667	2.060	0.151	True
T13	Teacher	16.967	3.792	0.223	True
T14	Teacher	9.233	0.333	0.036	True
T15	Teacher	8.100	0.638	0.079	True
T16	Teacher	9.133	0.797	0.087	True
T1	Admin	8.743	0.510	0.058	True
T2	Admin	13.203	0.962	0.073	True
T3	Admin	11.103	0.949	0.085	True
T4	Admin	8.207	0.685	0.084	True
T5	Admin	19.087	0.874	0.046	True
T6	Admin	16.233	0.628	0.039	True
T7	Admin	10.823	0.711	0.066	True
T8	Admin	15.727	0.669	0.043	True
T9	Admin	17.213	0.886	0.051	True
T10	Admin	21.117	0.942	0.045	True
T11	Admin	16.139	0.250	0.015	True
T12	Admin	19.190	0.680	0.035	True
T13	Admin	7.943	0.856	0.108	True
T14	Admin	8.710	0.320	0.037	True
T15	Admin	9.180	0.909	0.099	True

USER EVALUATION AND TESTING

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T14	Admin	8.710	0.320	0.037	True
T15	Admin	9.180	0.909	0.099	True

USER EVALUATION AND TESTING

TABLE XII
SYSTEM USABILITY SCALE (SUS) RESULTS BY ROLE

Role	N	Average SUS Score
Student	20	86.62
Teacher	10	89.00
Overall	30	87.42

TABLE XIII
FEATURE-SPECIFIC SATISFACTION SCORES

Feature	Average Score (1-5)	Target Met (≥ 3.5)
Data Visualization	4.40	Yes
Messaging System	4.40	Yes



CONCLUSION

CONCLUSION

1. Objective 1 (Secure, Centralized Database)
2. Objective 2 (Integrated Data Visualization)
3. Objective 3 (Structured Messaging System)
4. Objective 4 (ISO 9241-11 Alignment)



RECOMMENDATIONS

RECOMMENDATIONS

1. Developing a Mobile App
2. User Role for Parents or Guardians
3. More Advanced Analytical Capabilities



THANK YOU