Enterprise web software development

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Introduction

The system we have been told to develop is a sub system of a large university system. Here in this system there are different types of role to be performed such as QA manager, QA coordinator, Administrator, Student etc. The main target of this system is to collect ideas from student for development of the University in different sectors. And the ideas will be submitted by following the given topic. And user can leave comment or reaction on the submitted ideas. To provide solution we have developed a subsystem for against the given requirement by following the scrum methodology. We have completed the coursework through the combination of teamwork where we have a programmer & UI designer, database designer, tester and an analyst. Amongst these roles my performing area was to develop the database system as well as helping analyst to draw UML diagrams.

System Evaluation

Following agile scrum methodology, secure web-enabled role-based system "IdeaHunter" for collecting ideas has been developed successfully. User interface of this system is user friendly and designed with relevant information. And also responsive design has been ensured to support multiple devices. And also has been all the following requirements given to our group coursework. Assumption of functionalities also given below,

System functionality

1. In idea collecting application Quality Assurance manager will oversee all processes

2. QA manager will manage all the process of their department and will encourage students to post ideas
3. Students will be able to submit ideas including supporting documents and before submitting ideas they must agree Terms and Conditions
4. Before submitting any ideas categories and tagged will be used to differ one ideas to another
5. Categories will be added by QA managers and he can only remove category if that have not used
6. Both student and staff can view submitted ideas and also can comment on those ideas
7. Thumbs up and thumbs down will be used to find out most popular ideas
8. Students comment will be visible for both staff and students but staff comments can be seen by only others staff
9. Author of ideas can post anonymously and other students can also comment anonymously on ideas but details will be stored in the database for further investigation if any inappropriate ideas found
10. Two closer dates for post if first closer date goes away, ideas will be disabled and new ideas cannot submit but comments can continue until final closer date goes away.
11. Staff will get email notification when ideas will be submitted
12. Author also will get automatic email notification if other student comments on their idea for each comment

13. Staff and student both can see most viewed ideas, popular ideas, latest ideas and latest comments.
14. QA manager will be able to download all the selected ideas in a zip file after final closer date goes away
15. Staff details, student details and closer date for academic years will be managed by Administrator
16. Different types of reports can be generate for example- total ideas made by each department, percentage of submitted ideas for each department, contributors within each departments, ideas without comments, anonymous ideas and comments.
17. User interface will be suitable for all devices

Assumption

1. Category and tagged has used differently in this system to meet system requirements
2. After download any idea it will be in text file in the zip folder along with supporting documents
3. Searching has been used to enrich this system

System walkthrough

“Idea Hunter” is role-based secure idea collecting and sharing system in a large university for improvement. Students will share their idea using this system while university staff will use this system to manage the process. System functionality is described below with associated screenshot.

Security for this system has been maintained strictly through authentication so that unauthorized user cannot access the system without their credentials. And if anyone tried to login multiple times with wrong password, system automatically pause for a while.

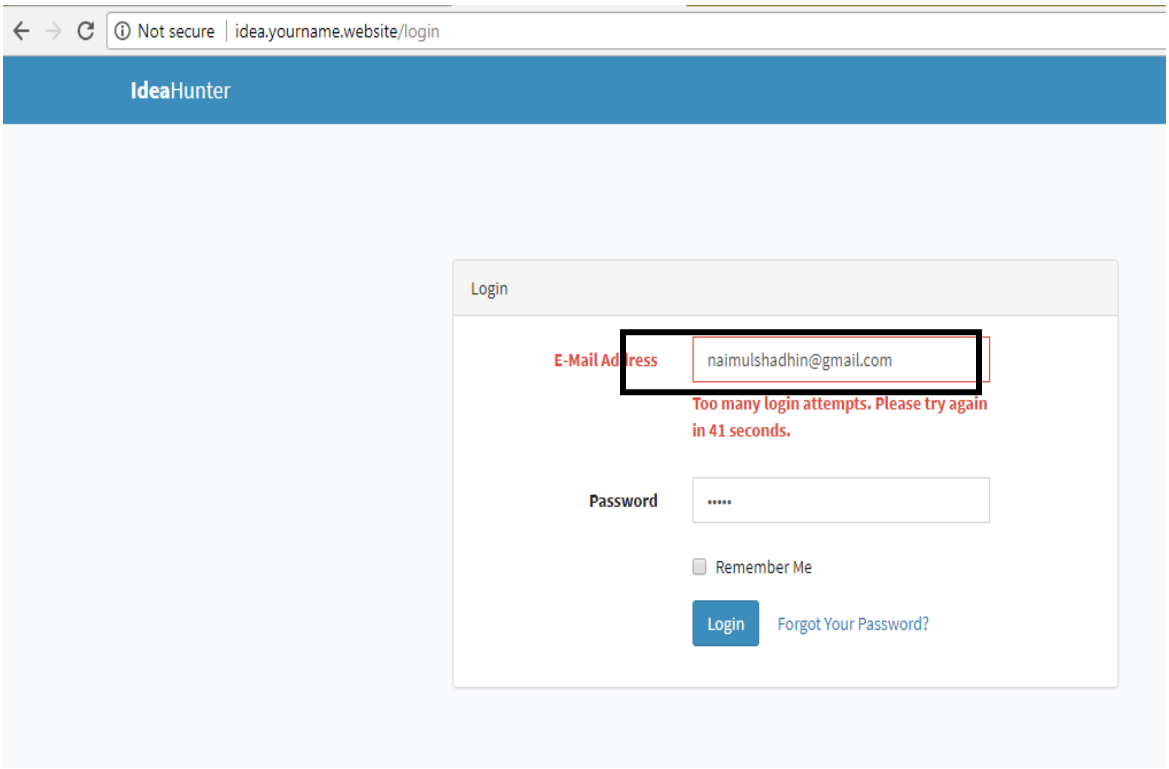

Figure 1: Multiple wrong attempts

Super-Admin

Super Administrator can manage everything including topics, staff roles, academic session, category, tag, departments and importantly can block student after completing their academic session. Can also block and staff after they left their jobs or retirements.

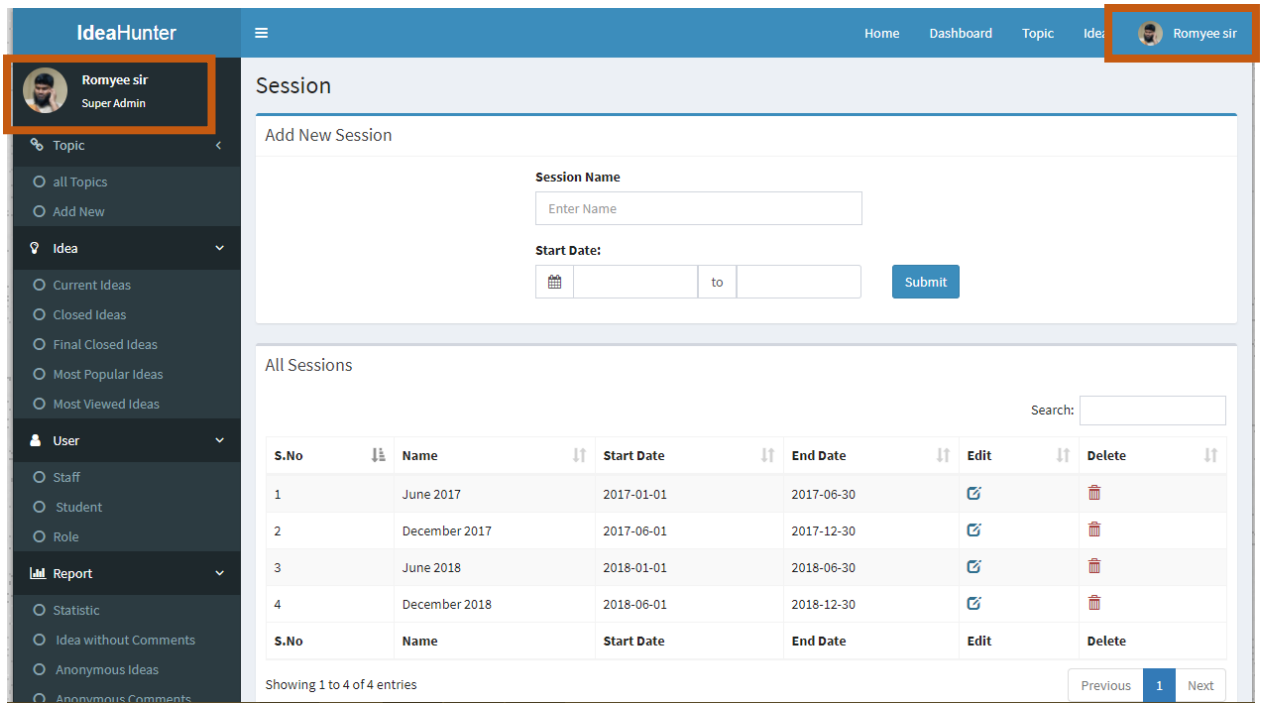

Figure 2: View of Super Admin

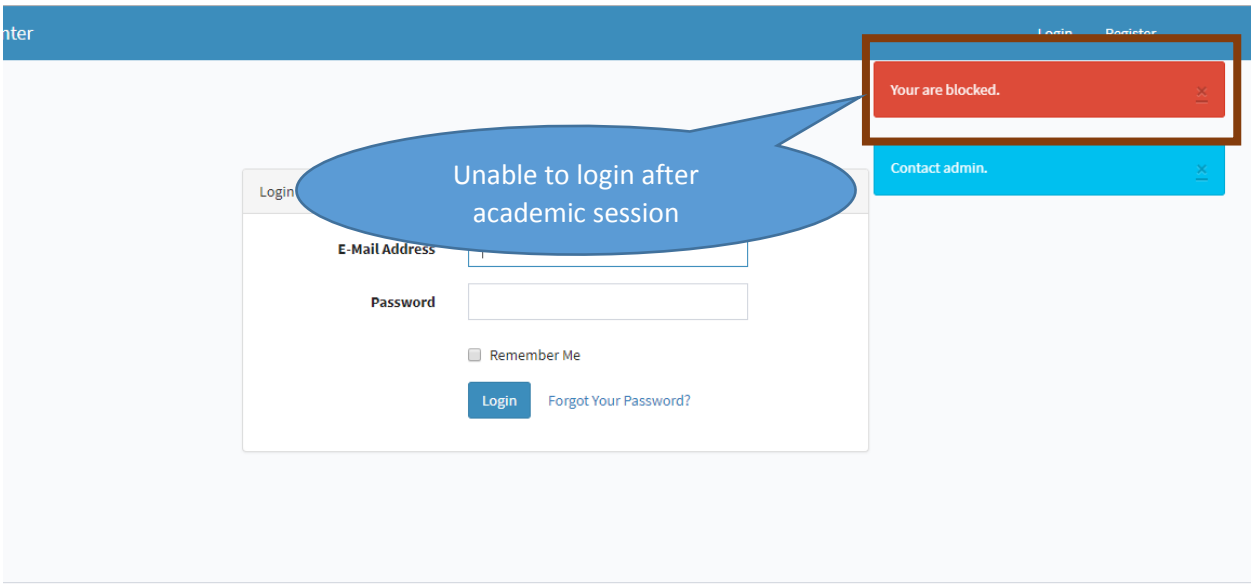

Figure 3: Block function for staff and user

Super admin can view overall system and see statics views of department's contribution, comparison for open and closed ideas. And also can most visited and most popular ideas.

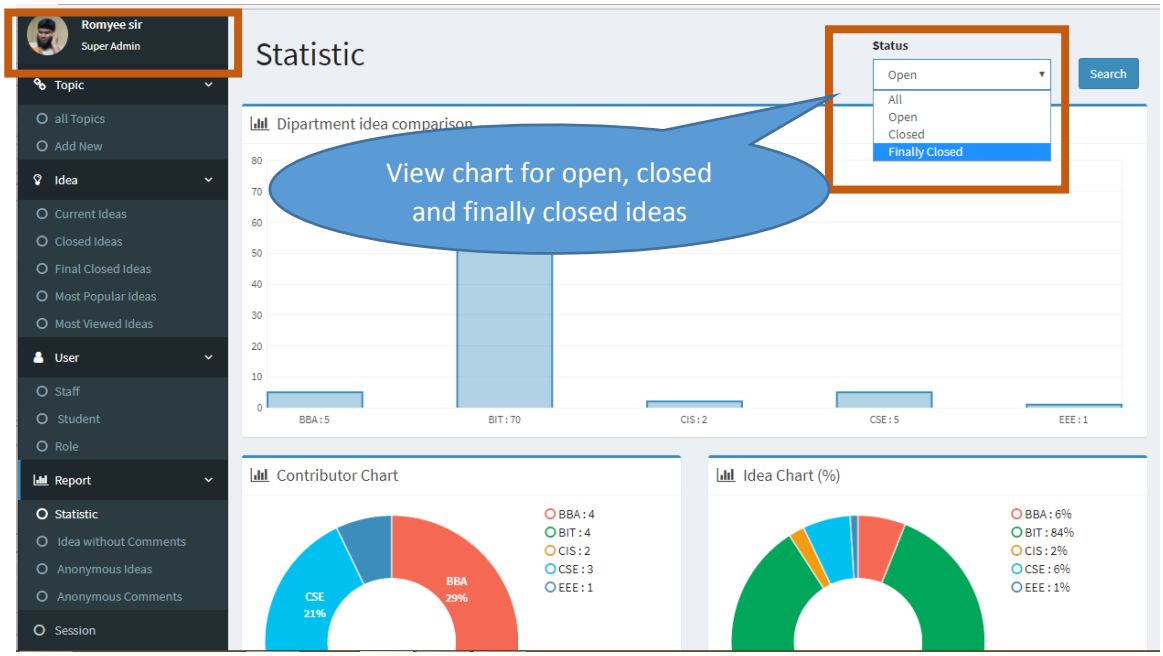

Figure 4: statistical view for ideas

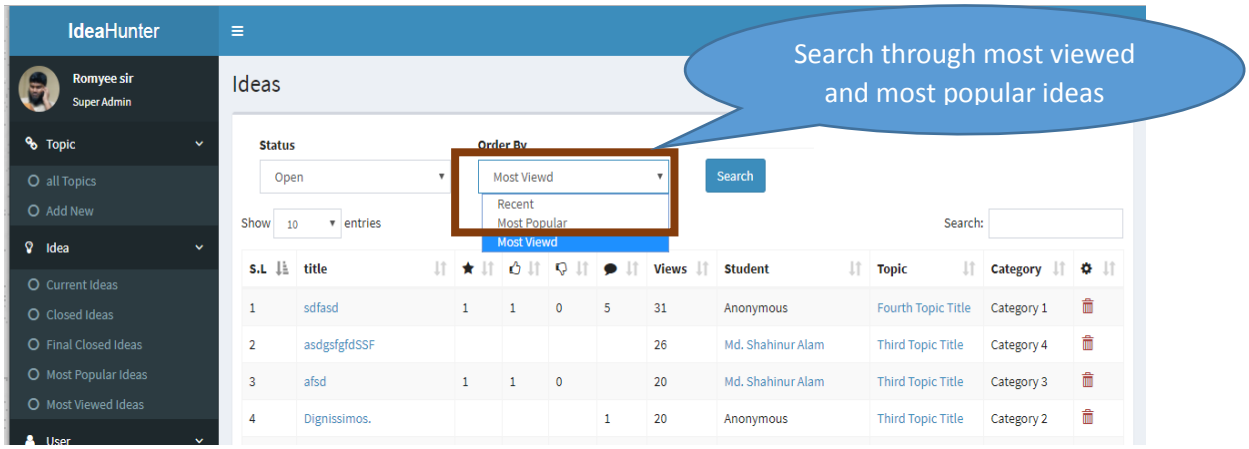

Figure 5: Most viewed and popular ideas

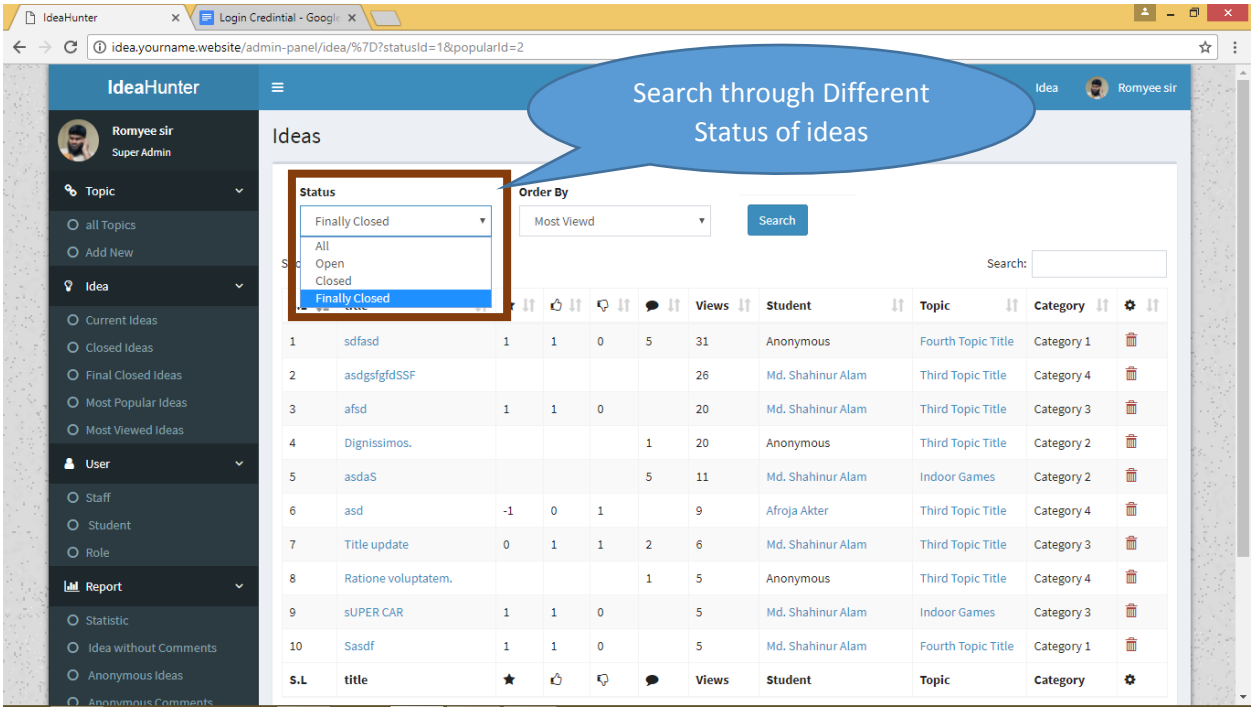

Figure 6: View of open and closed ideas

QA Manager

Processes of QA manager within this system is described below with related screenshot. QA manager can add and delete categories and also can only download ideas if that topic is closed. One more things for staff is that one staff can only view other staffs comments and also see student's comments but students can only view student's comments when a comment is done in any ideas.

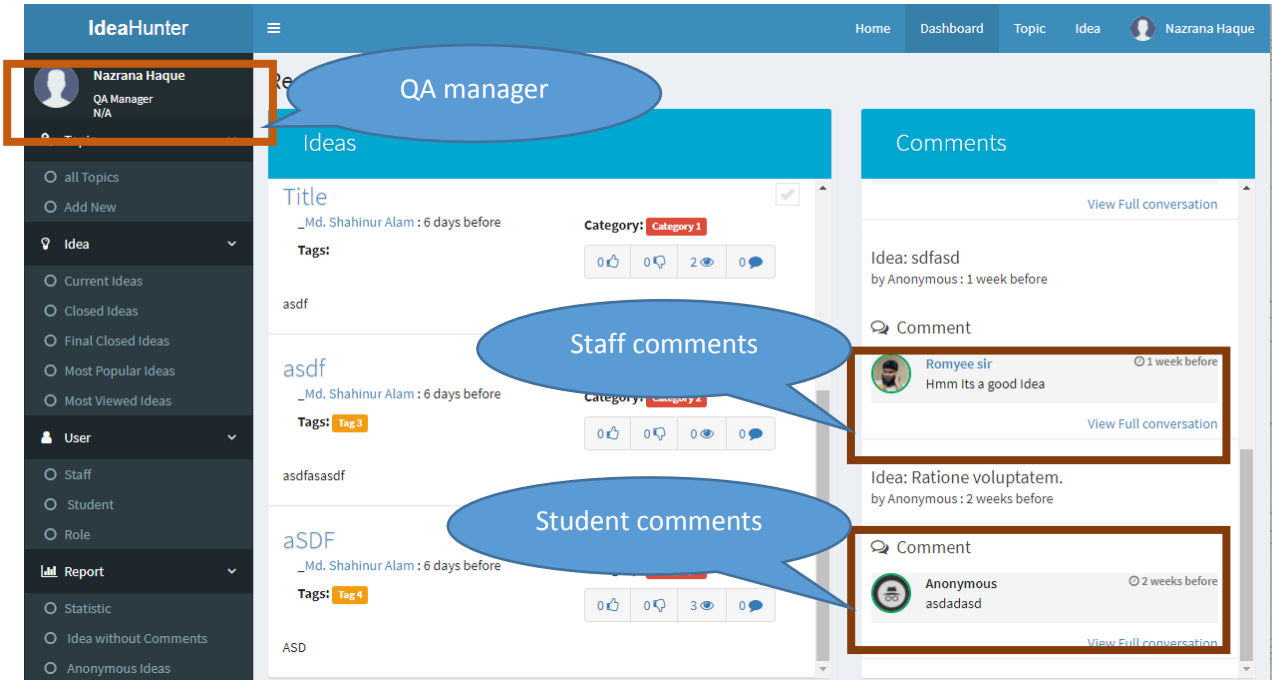

Figure 7: View of staff comments

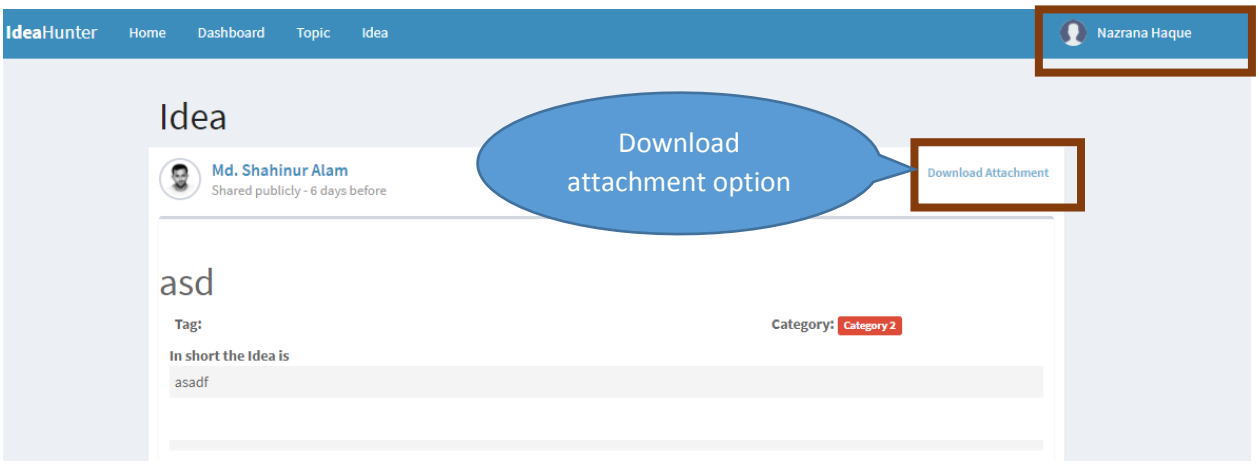

Figure 8: Download of closed ideas

Download ideas will be downloaded as zip file and ideas will be automatically text after compressing zip along with attachments.

Figure 9: Idea Download as ZIP folder

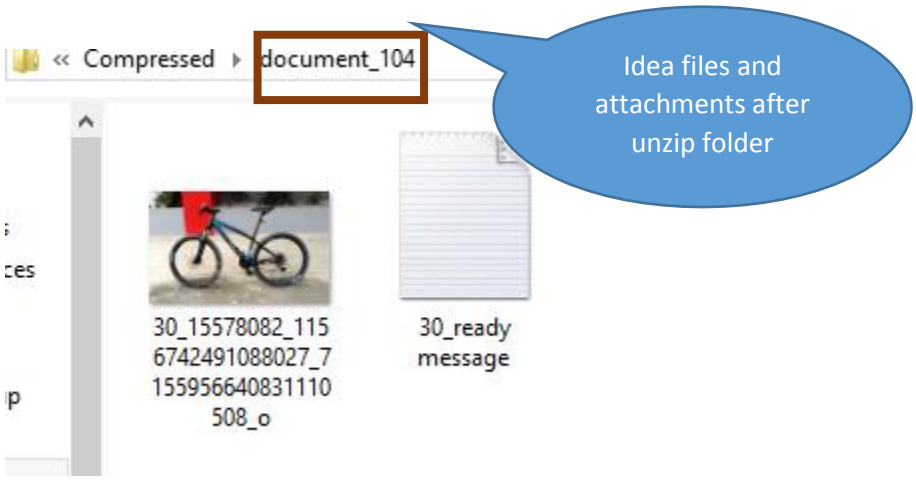

Figure 10: Idea download as text file along with attachments

Delete field is invisible because each category contains available ideas and also as per requirements only QA manager can add and delete categories.

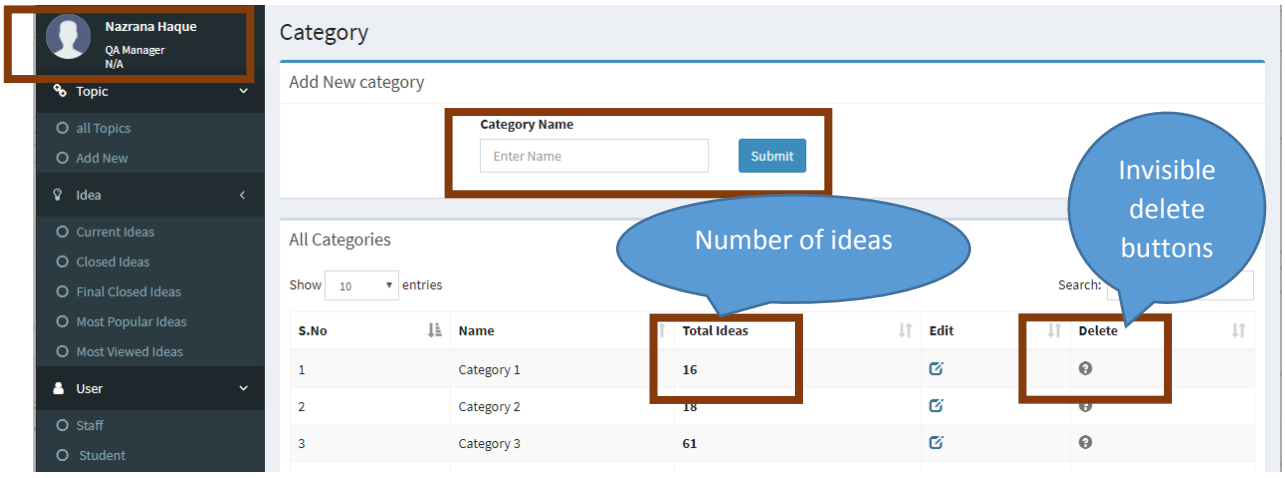

Figure 11: Category cannot delete if idea exist

QA coordinator

QA Coordinator is responsible for managing process of their departments and encourages students to share their ideas in this system using graph chart. Also able to view other processes but cannot modify them.

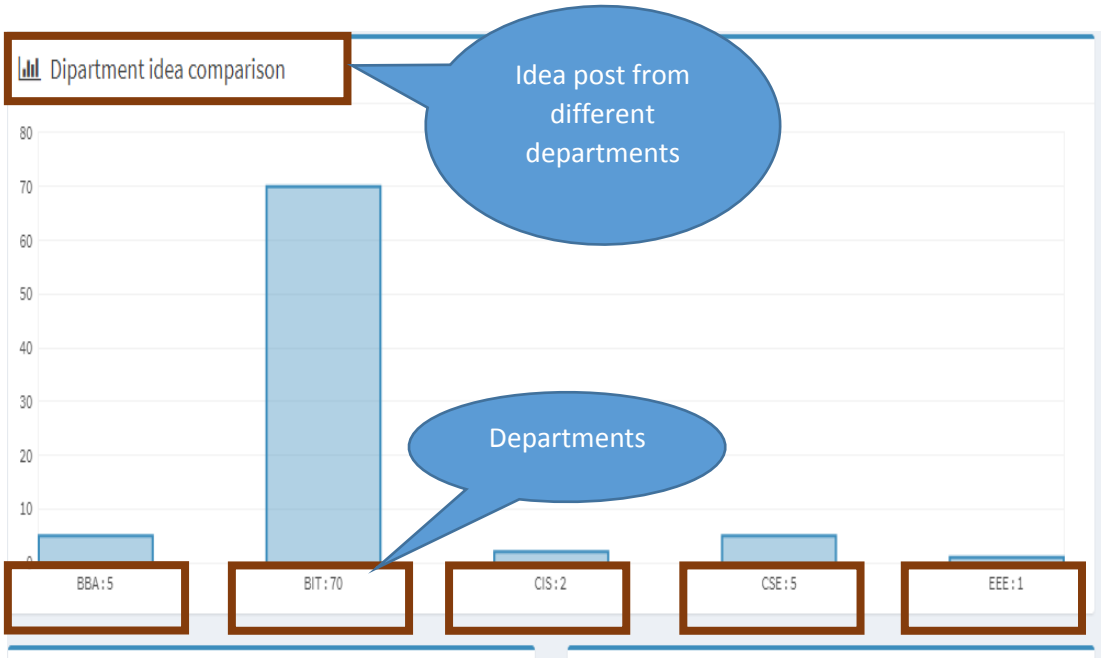

Figure 12: view of department idea comparison

Student

Students are the main user of this system because they will post ideas to improve university environments. As mention in the coursework they can submit ideas with multiple documents by agreeing terms and conditions. Requirements of coursework has been fulfilled successfully and main process of students in this system is given below with proper screenshot

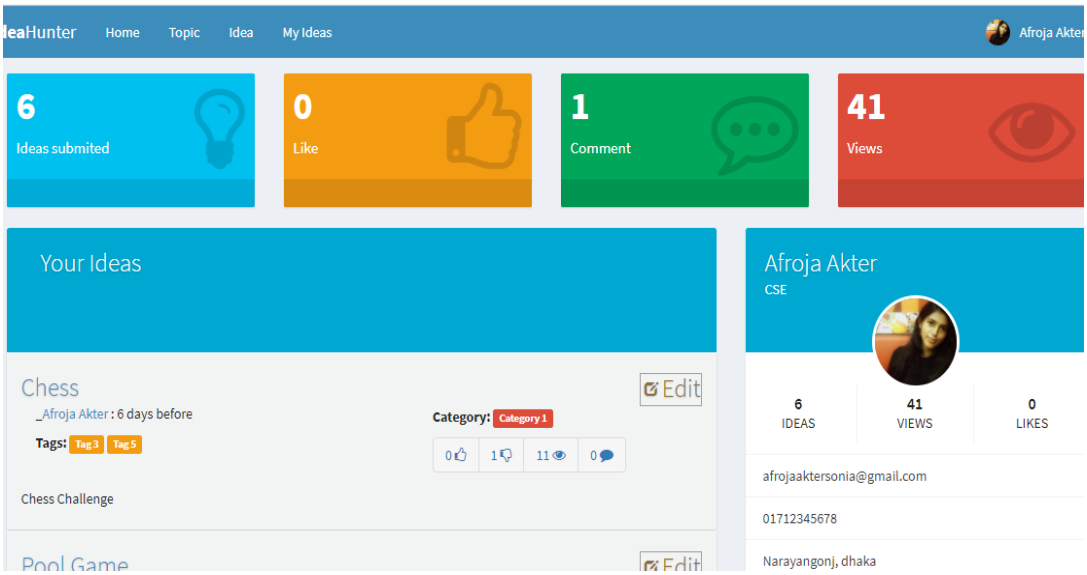

Figure 13: View of Student Profile

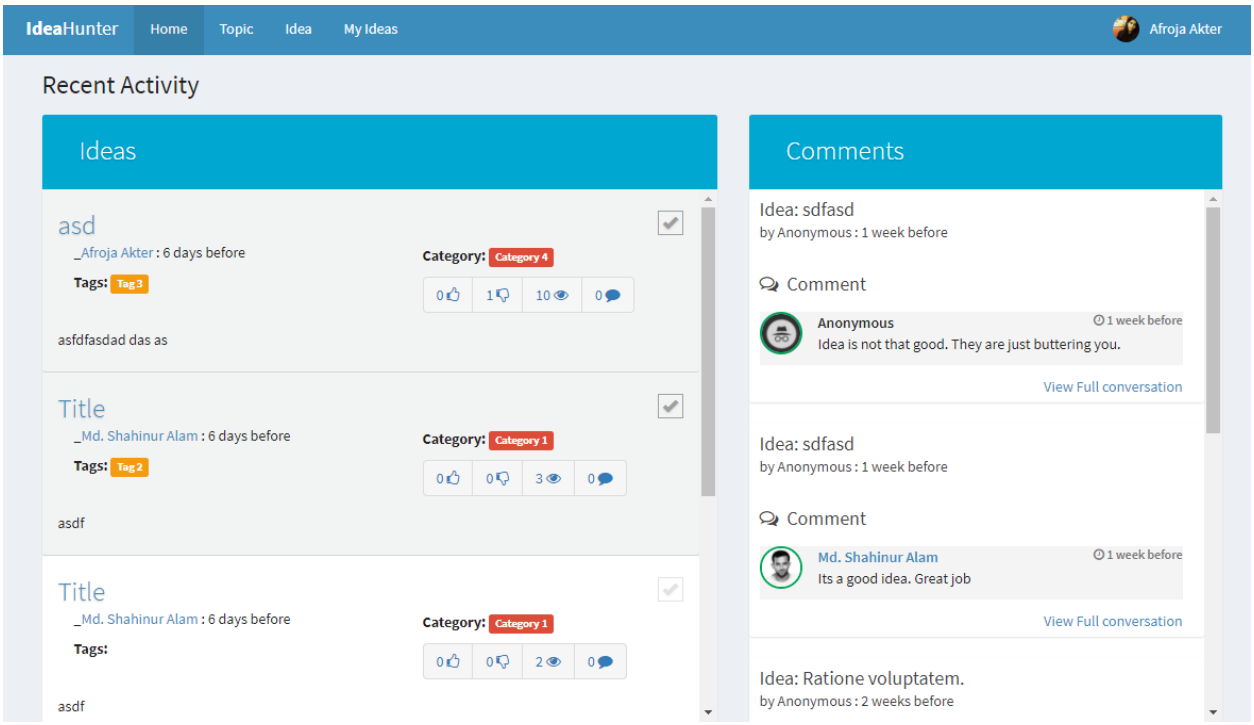

Figure 14: View of Student Dashboard

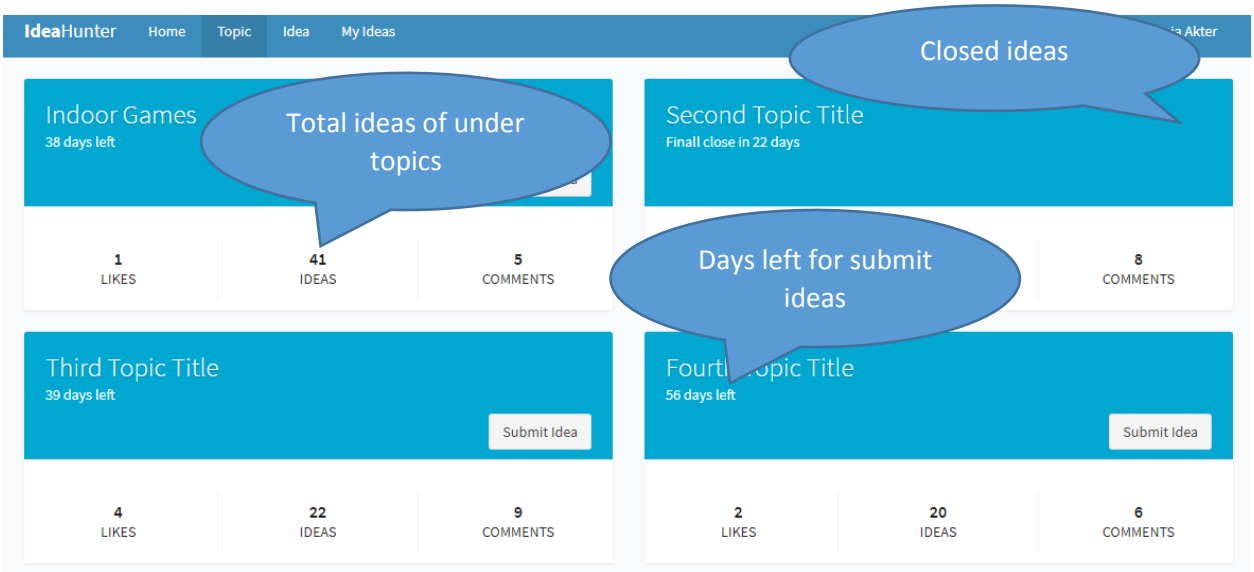

Figure 15: View of Topics status

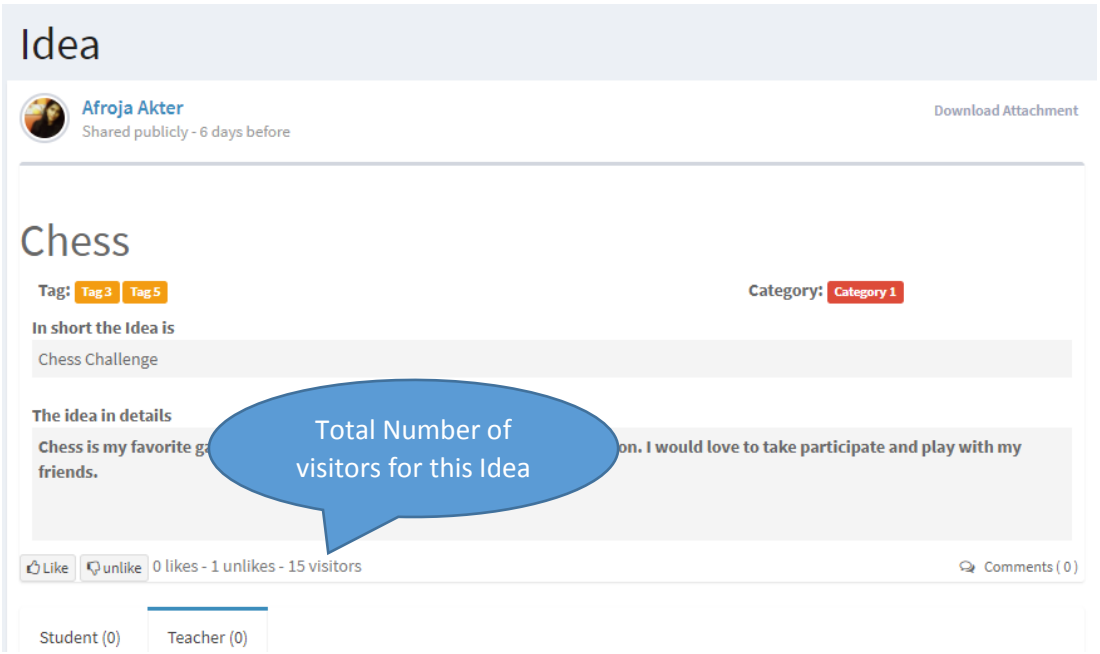

Figure 16: View of submitted ideas

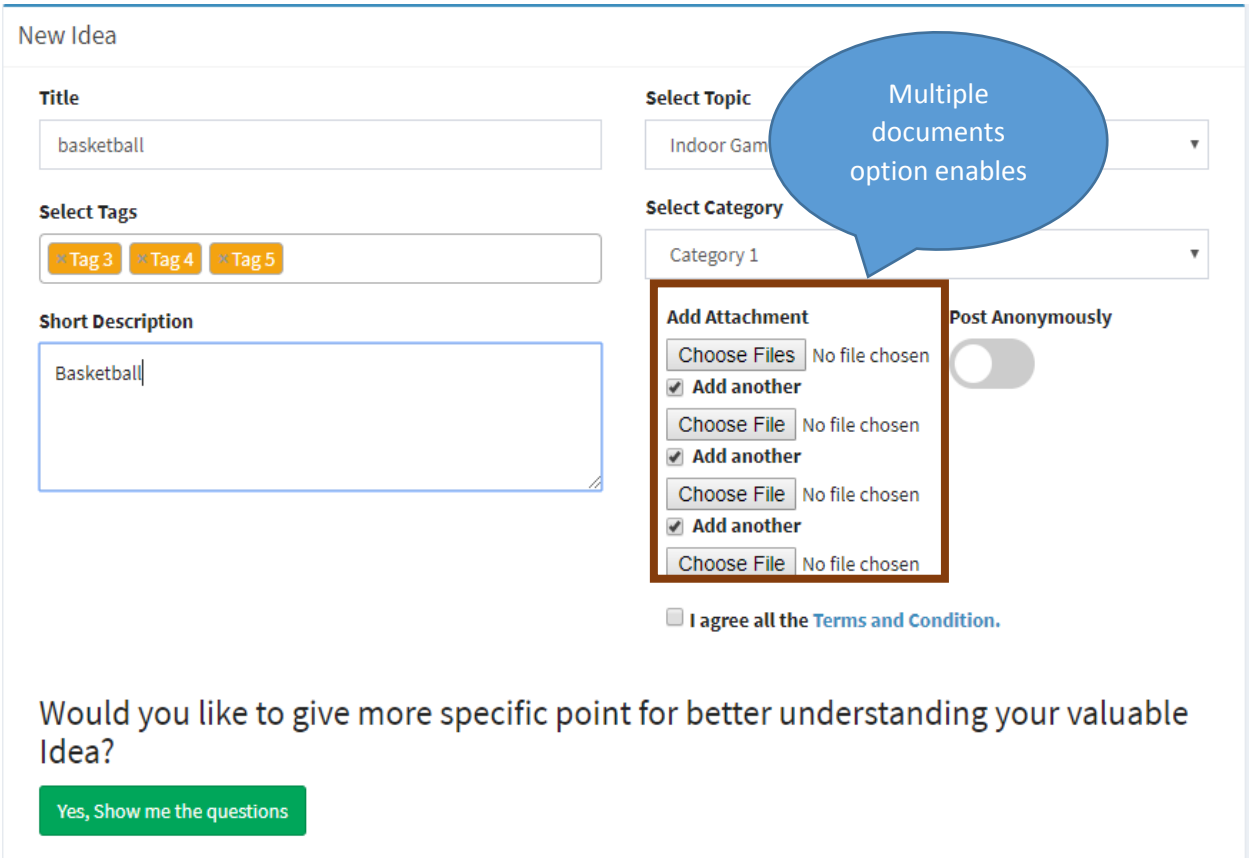

Figure 17: Multiple file attachment

Strength of IdeaHunter System

1. System is secure from unauthorized access, hacking, loss, destruction and data corruption because password have encrypted using MD5 Hashing and also SQL injection algorithm has been used to protect information. Only authorized user can login this site using their username and password. Authentication has maintained properly so that each user can login their requested credential because Idea Hunter is role-based system.

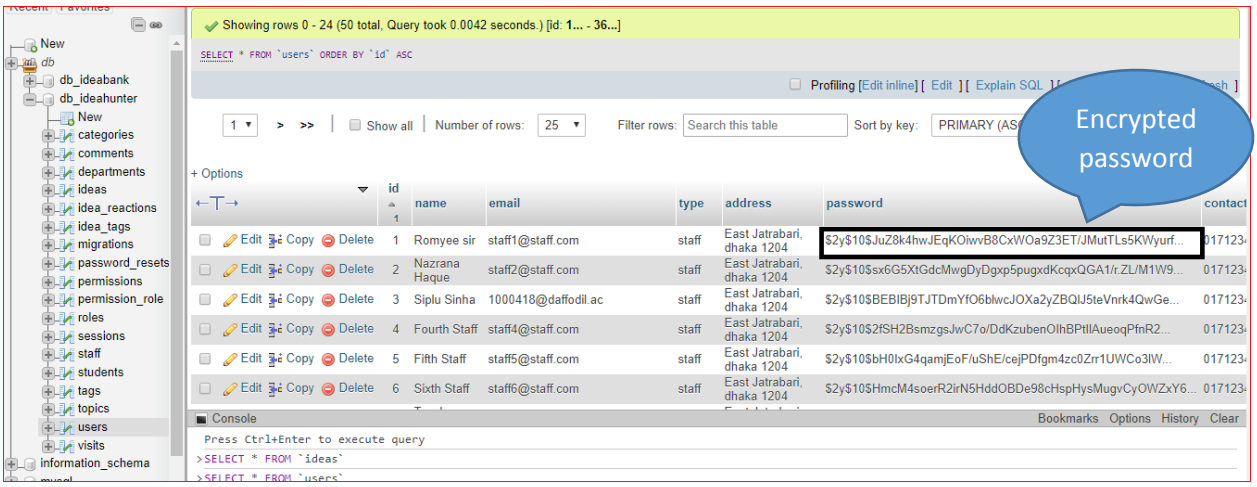

Figure 18: Password encryption using MD5 hashing algorithm

2. Interface is responsive and suitable for all devices

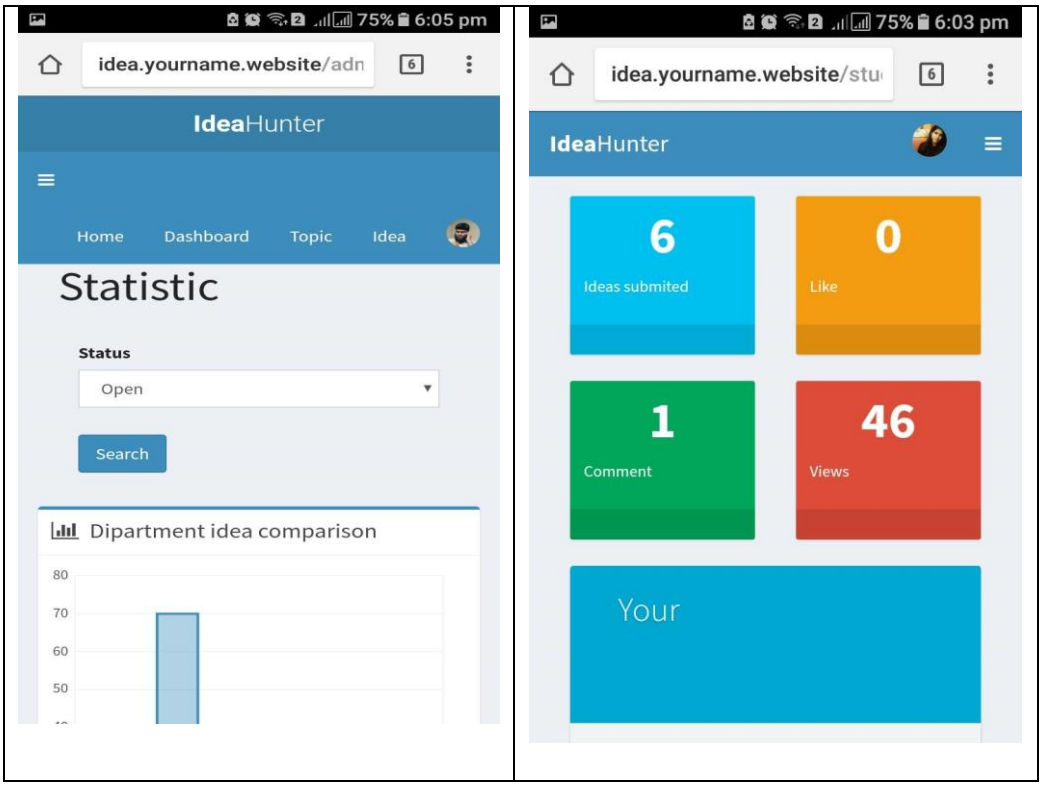

Figure 19: Mobile View of IdeaHunter system

3. Various types of statistics and reports are available on different assessment including exceptional reports.

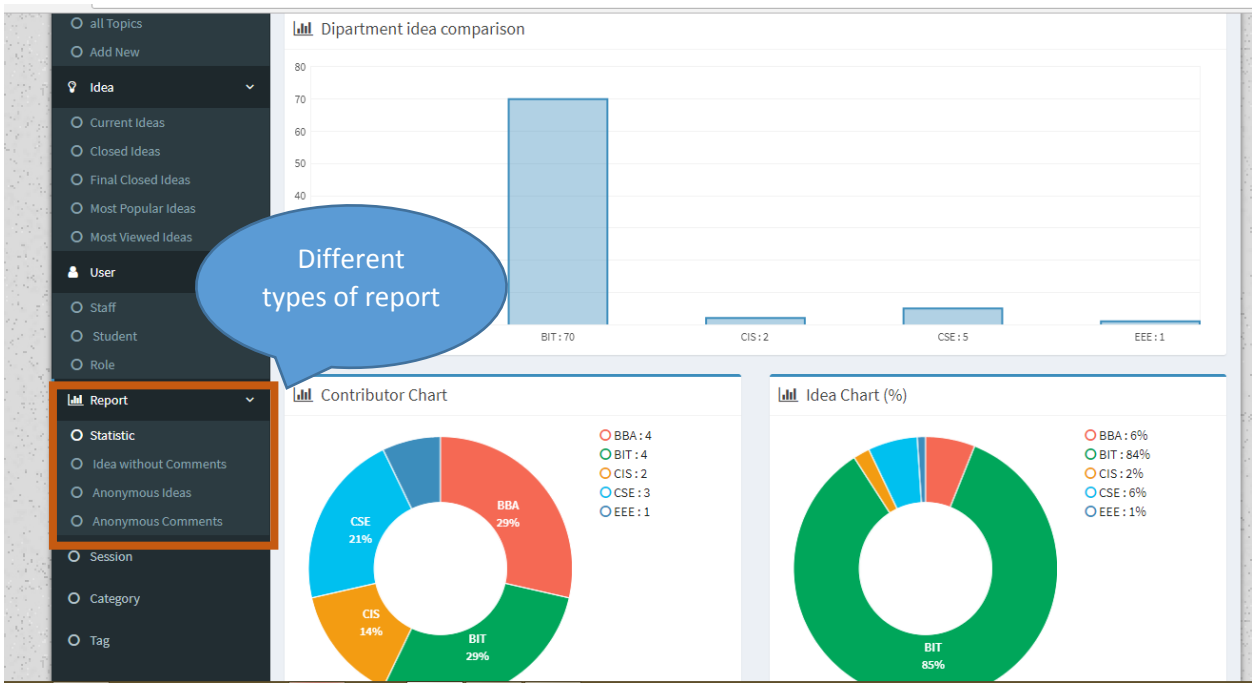

Figure 20: View of Reports

4. Super admin can provide different role for different staff because role is not fixed for all staff. Super admin can customize role for each staff.

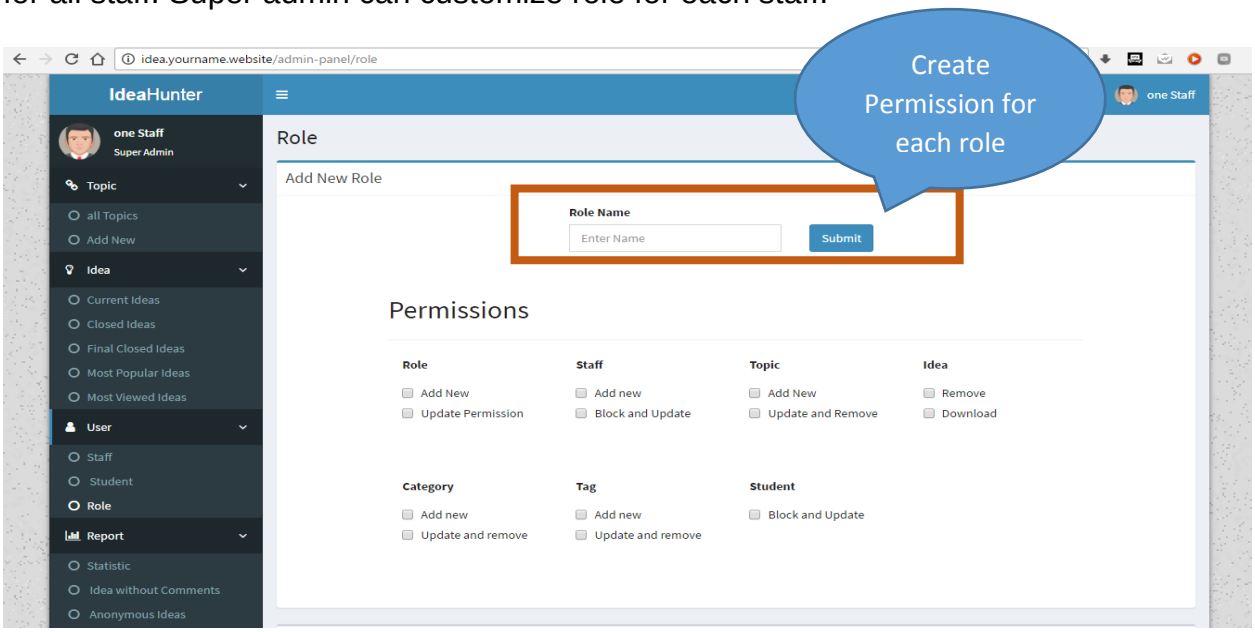

Figure 21: View of Role-based system

5. Successfully send email notification for both student and staff

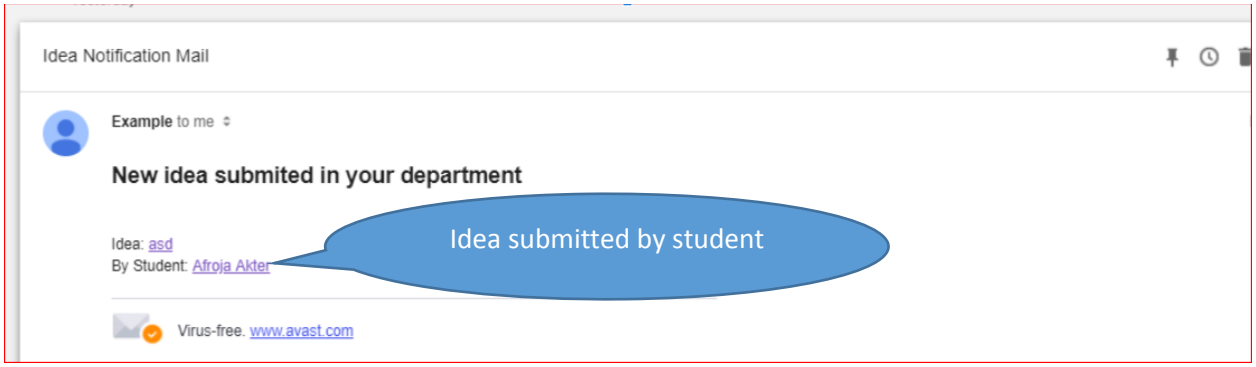

Figure 22: Email notification for posted idea from student

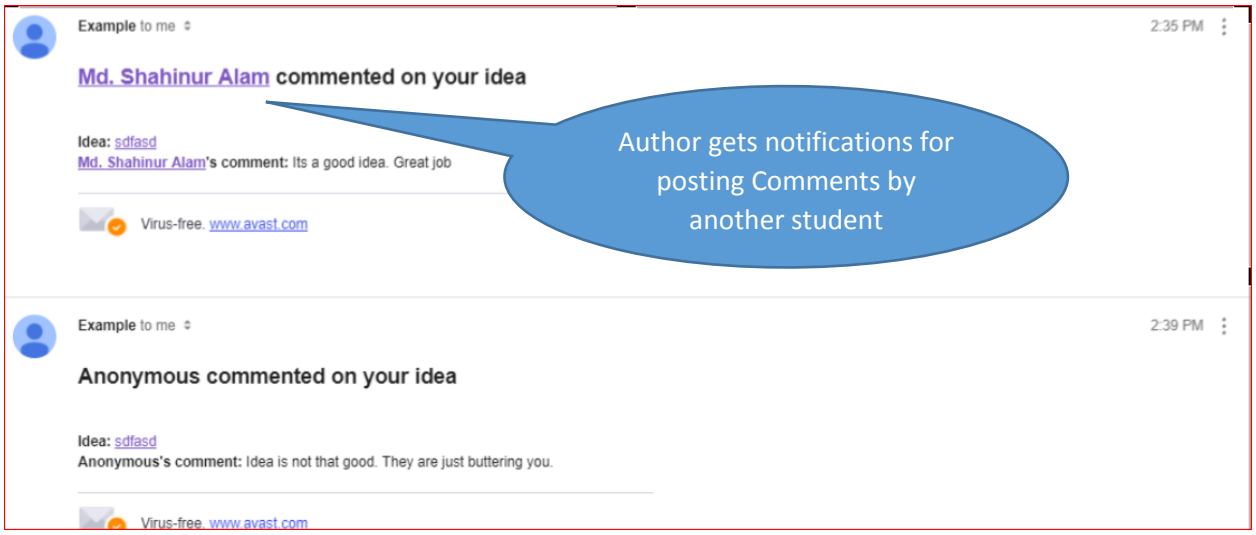

Figure 23: Comments notification from students

Weakness of IdeaHunter System

1. Post for ideas cannot delete once submitted
2. Some parts of User-Interface is not comparatively well designed
3. Uploaded documents for each post need to view by downloading ideas separately

4. All ideas or selected ideas cannot be downloaded together. Ideas have to be download separately

Further development

1. Dashboard notification will be added
2. Live chatting system will be integrated
3. Two-factor authentication will be used in the system to give extra protection
4. All ideas or selected ideas will be download together

Assessment of team members

The system “IdeaHunter” has been developed successfully by team member’s active participations and involvements. Every member takes their role seriously so that system can meet given requirements within scrum sprint backlog. System architect have identified functional and non-functional requirements properly and prioritize using MoSCoW and draws use-case, class diagram and sequence diagram from given scenario accurately. Every team member performance is good but among them developer did excellent works to successfully develop this system. System has been tested to improve system performance by finding and fixing errors.

Following characteristics have been used for evaluating team members including me. A weighted model scale has been provided to understand the evaluate process and assessment criteria for each member is given below,

Weighted model

Performance Evaluation	Weight
Outstanding	5
Excellent	4
Very Good	3
Satisfied	2
Poor	1

Scoring Model for Shahinur Alam

Name	Shahinur Alam				
Role	UI Designer and Developer				
Performance Rating					
Performance Evaluation	Outstanding	Excellent	Very Good	Satisfied	Poor
Meeting Attendance					
Communication					
Contribution					
Technical knowledge					
Punctuality					
Friendliness					
Comments	UI designer and system developer gives best efforts to meet system requirements identified by system analyst and designed				

	a responsive interface.

Scoring Model for Minhajul Abadin

Name	Minhajul Abadin				
Role	Tester				
Performance Rating					
Performance Evaluation	Outstanding	Excellent	Very Good	Satisfied	Poor
Meeting Attendance	✶				
Communication		✶			
Contribution	✶				
Technical knowledge	✶				
Punctuality	✶				
Friendliness		✶			
Comments	Tired his best to keep the system error free and ensure that system is safe from other unauthorized access.				

Scoring Model for Rafiqul Islam

Name	Rafiqul Islam
Role	Analyst
Performance Rating	

Performance Evaluation	Outstanding	Excellent	Very Good	Satisfied	Poor
Meeting Attendance		★			
Communication			★		
Contribution		★			
Technical knowledge		★			
Punctuality		★			
Friendliness	★				
Comments	Analyst gives fair effort to draw UML diagrams but he completed all the diagrams properly.				

Scoring Model for Afroja Akter Sonia

Name	Afroja Akter Sonia
Role	Database
Performance Rating	

Performance Evaluation	Outstanding	Excellent	Very Good	Satisfied	Poor
Meeting Attendance		★			
Communication	★				
Contribution	★				
Technical knowledge	★				
Punctuality	★				
Friendliness		★			

Comments:	Database developer designs a role-enables database using appropriate data types and validation.

Self-Evaluation

As a database developer my tasks was to design a secure role-based enable database with implementing referential integrity, appropriate data types and using proper validation. I have tried to give my best effort to design a secure role-based enable database by following given requirements from collecting documents and diagrams from analyst.

Firstly I draw a conceptual diagram using identified requirements from sprint backlog and product backlog.

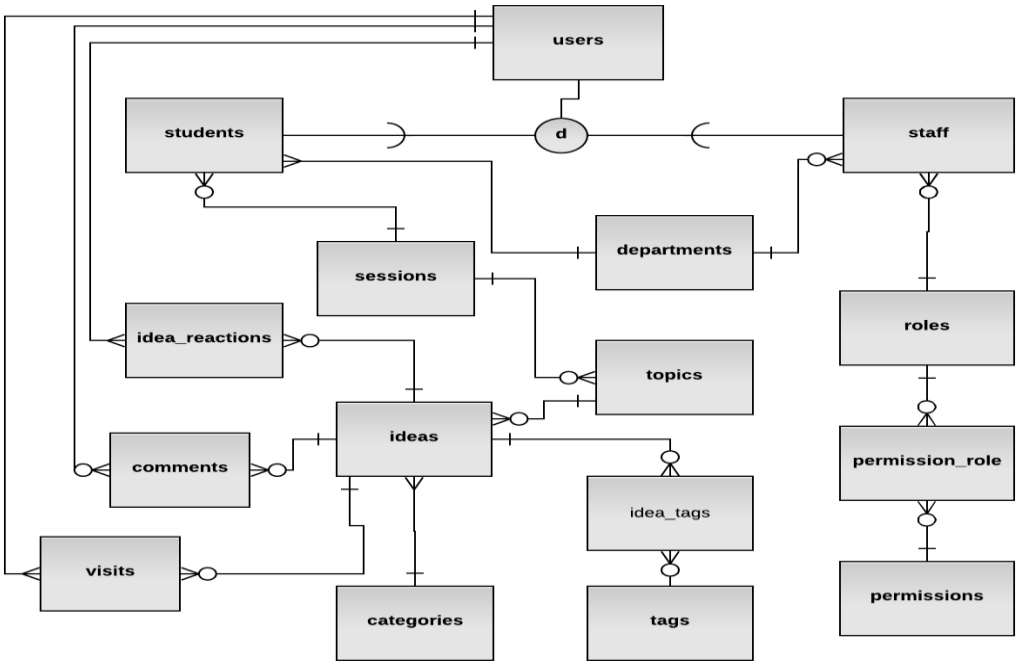

Figure 24: Conceptual diagram of Idea Hunter system

Then I discussed with my team members in scrum meeting and identify requirements in details and draw my Enhanced Entity Relationship Diagram (EERD).

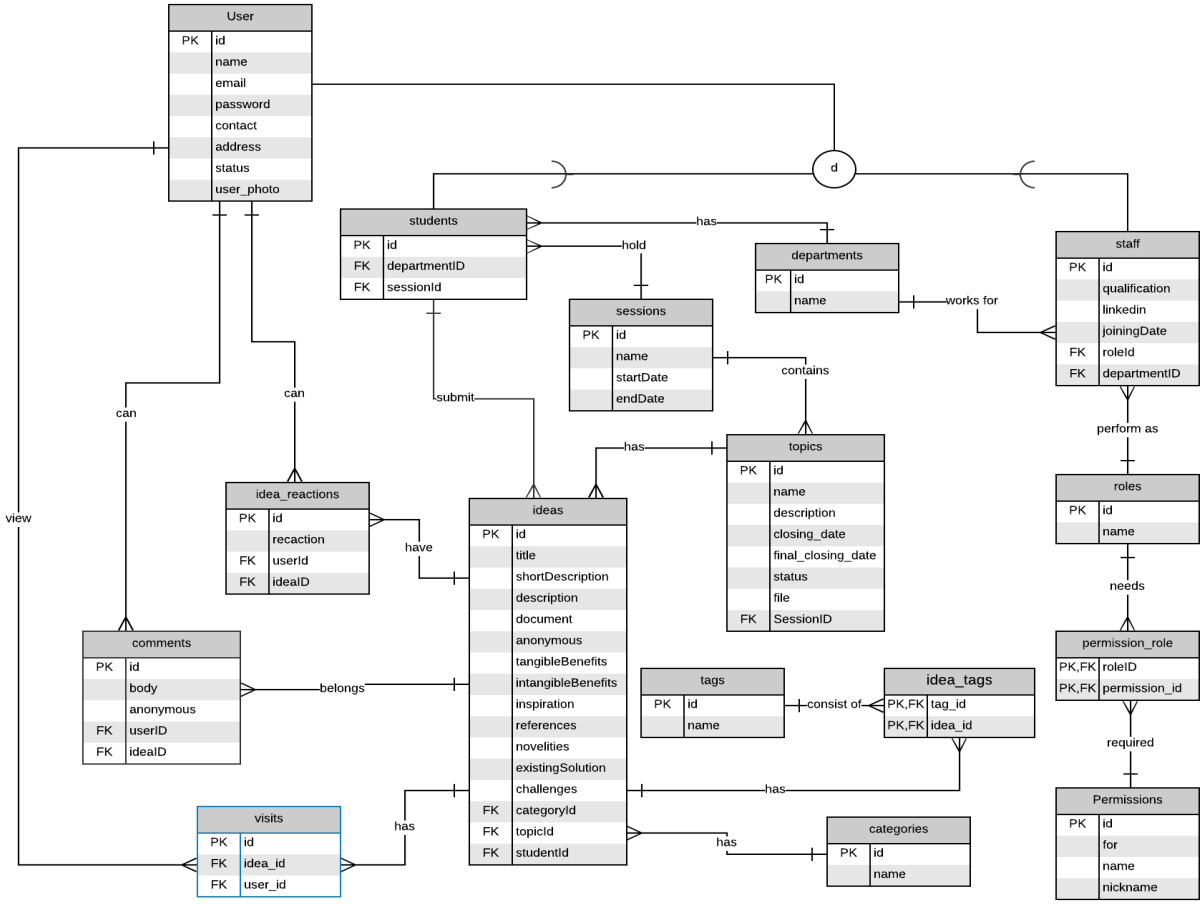

Figure 25: EER diagram of Idea Hunter system

Referential integrity has been used to make this database secure and efficient. Referential integrity helps user in quick search to find their desirable information.

Relation Name	Foreign Table	Primary Table	Foreign Table Column	Primary Table Column

comments_idea_id_foreign	comments	ideas	idea_id	id
comments_user_id_foreign	comments	users	user_id	id
ideas_categoryid_foreign	ideas	categories	categoryid	id
ideas_studentid_foreign	ideas	students	studentid	id
ideas_topicid_foreign	ideas	topics	topicid	id
idea_tags_idea_id_foreign	idea_tags	ideas	idea_id	id
idea_tags_tag_id_foreign	idea_tags	tags	tag_id	id
staff_departmentid_foreign	staff	departments	departmentid	id
staff_roleid_foreign	staff	roles	roleid	id
students_departmentid_foreign	students	departments	departmentid	id
students_sessionid_foreign	students	sessions	sessionid	id
topics_sessionid_foreign	topics	sessions	sessionid	id

Role-based database has been designed in the Enhanced Entity Relationship Diagram and later system developer applied this while developing the system. Through role based database system super admin can gives permissions of other staffs and modify their roles easily if required. Mapping of tables are given below,

Table	**Attributes**
users	**id**, name, email, type, address, password, contact, status, user_photo
departments	**id**, name
sessions	**id**, name, startDate, endDate

students	**id**, **sessionId**, **departmentId**
roles	**id**, name
staff	**id**, qualification, linkedin, joiningDate, **roleId**, **departmentId**
Permissions	**id**, for, name, nickname
permission_role	**role_id, permission_id**
topics	**id**, name, description, closing_date, final_closing_date, slug, status, file, **sessionId**
tags	**id**, name
categories	**id**, name
idea_tags	**tag_id**, **idea_id**
ideas	**id**, title, shortDescription, description, document, anonymous, tangibleBenefits, intangibleBenefits, inspiration, references, novelities, existingSolution, challenges, **studentId**, **categoryId**, **topicId**
idea_reactions	**id**, **idea_id**, **user_id**, reaction
comments	**id**, body, anonymous, **idea_id, user_id**
visits	**id**, **idea_id, user_id**

Used mapping techniques in EERD to remove redundancy and define primary key and foreign key for each relation. Later relational schema derived from EERD using mapping process.

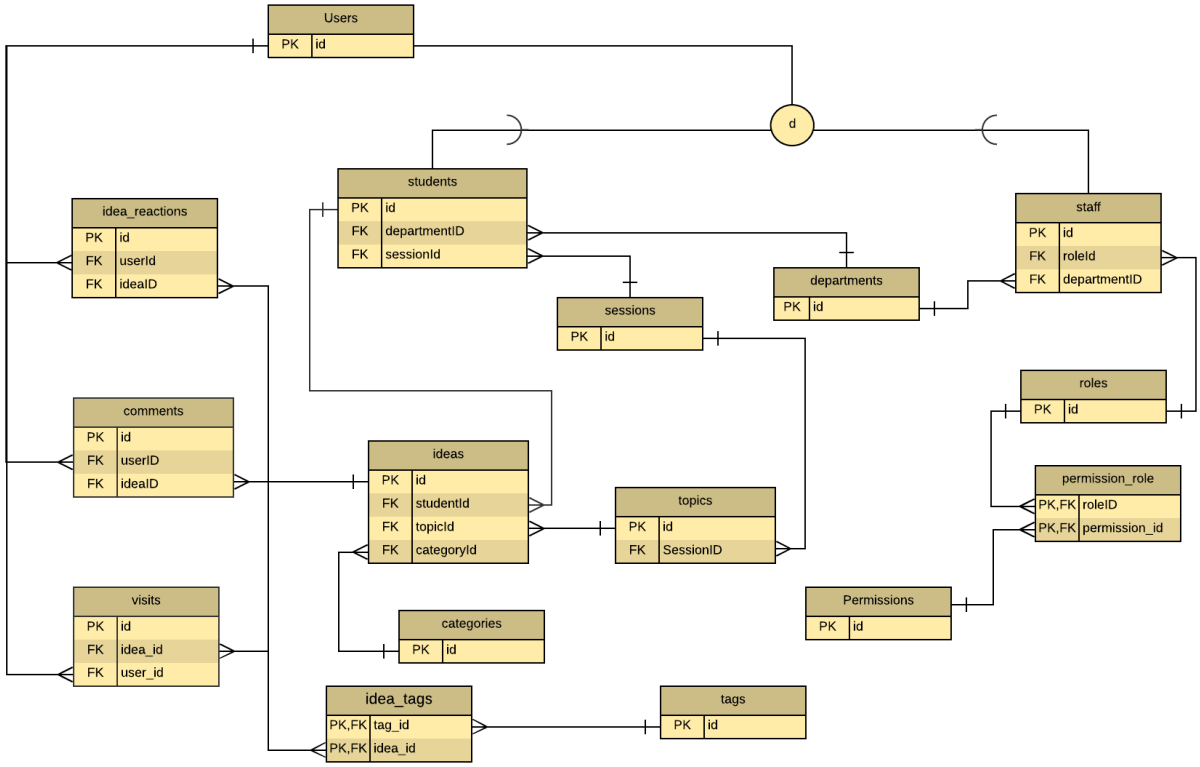

Figure 26: Relational Schema of Idea Hunter system

Normalization is not required because there does not exist repetitive group, partial key dependencies and non-key dependencies after mapping EERD to mapping.

Data dictionary has been prepared using appropriate data types and validation and also appropriate use of referential integrity to make the database secure. Few tables are given below and to see the rest of tables of data dictionary please see repository,

Table: Students

Attributes	Data type	Length	Primary key	Foreign Key	Reference Table
id	int	10	Yes		

sessionId	int	10		yes	sessions
departmentId	int	10		yes	departments

Table: Comments

Attributes	Data type	Length	Primary key	Foreign Key	Reference Table
Id	Int	10	Yes		
body	text				
anonymous	int	1			
idea_id	int	10		Yes	ideas
user_id	int	10		Yes	users

Table: Ideas

Attributes	Data type	Length	Primary key	Foreign Key	Reference Table
id	int	10	Yes		
title	varchar	255			
shortDescription	varchar	400			
description	text				
document	varchar	191			
anonymous	Int	1			

tangibleBenefits	Text				
intangibleBenefits	Text				
inspiration	varchar	400			
references	varchar	400			
novelities	varchar	400			
existingSolution	varchar	400			
challenges	varchar	400			
studentId	int	10		Yes	students
categoryId	int	10		Yes	categories
topicId	int	10		Yes	topics

Table: staff

Attributes	Data type	Length	Primary key	Foreign Key	Reference Table
Id	int	10	Yes		
qualification	varchar	255			
linkedin	varchar	100			
joiningDate	date				
roleId	int	10		Yes	roles
departmentId	int	10		Yes	departments

Table: Topics

Attributes	Data type	Length	Primary key	Foreign Key	Reference Table
id	Int	10	Yes		
name	varchar	255			
description	text				
file	varchar	191			
closing_date	date				
final_closing_date	date				
status	int	1			
sessionId	int	10		Yes	sessions

Database implementation code and referential integrity and others documents and diagrams are given in the group repository. After complete the system, physical diagram has been designed.

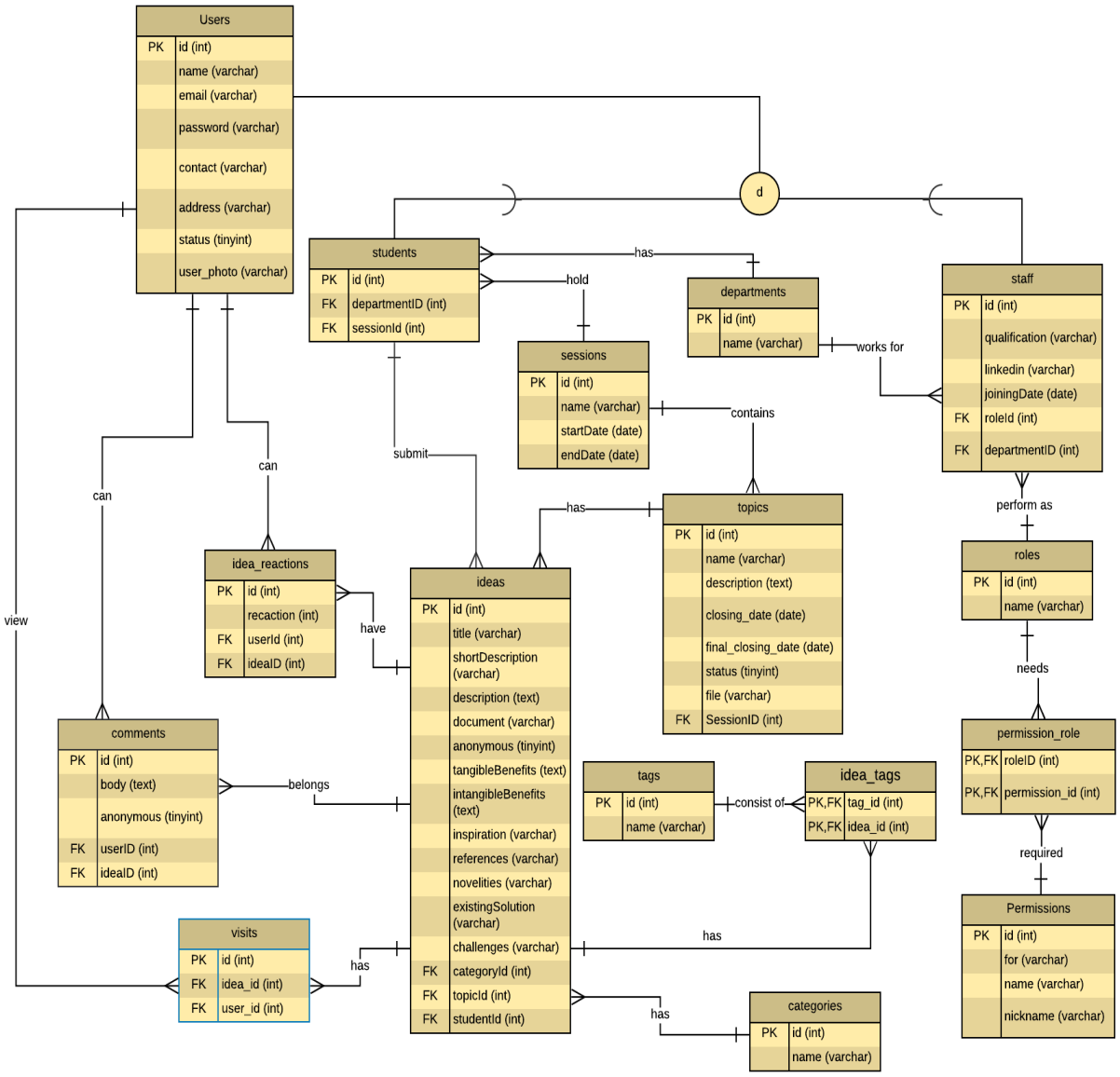

Figure 27: Physical diagram of Idea Hunter system

Database implementation table is given below to show that table has been created properly using phpMyadmin. Few samples of table creation are given below and the rest of screenshot is in the repository.

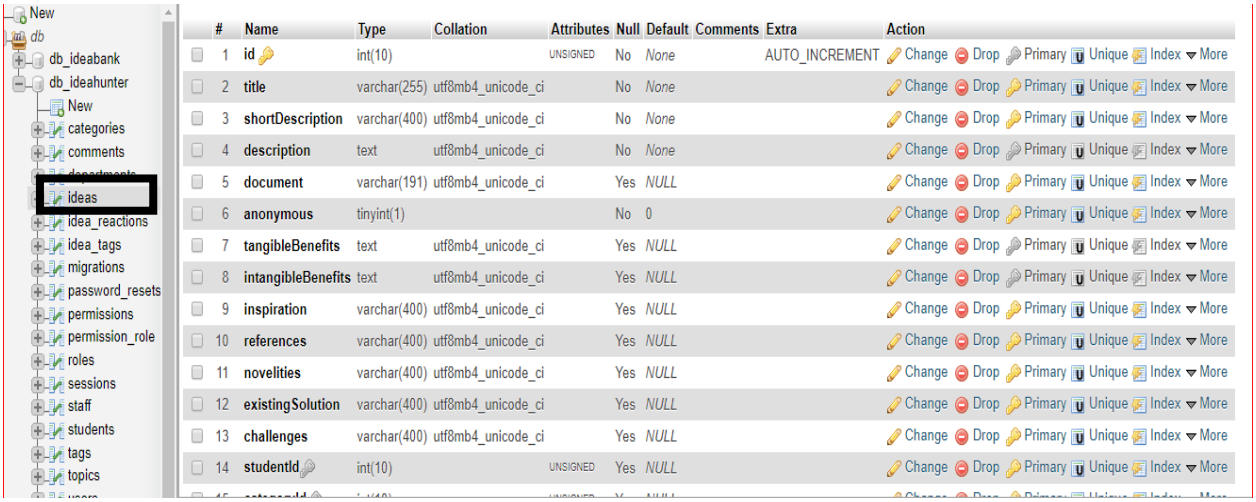

Figure 28: View of Idea table

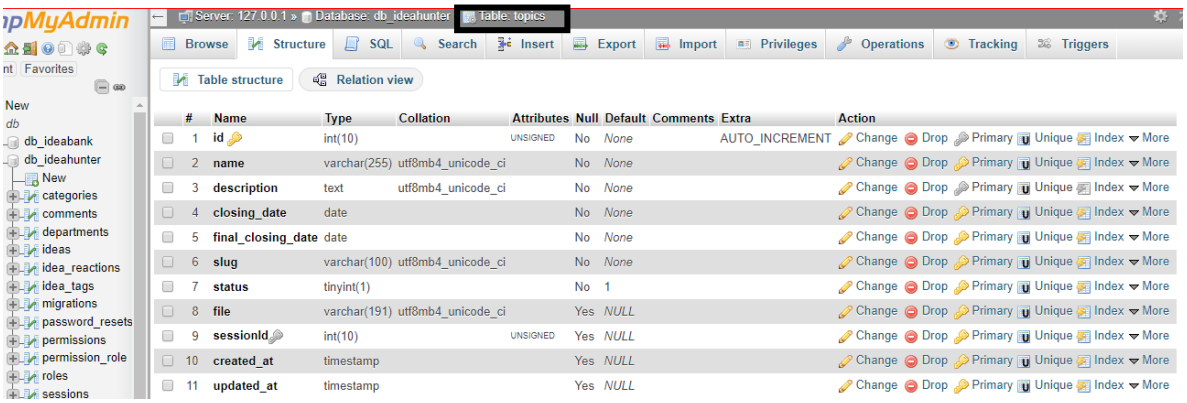

Figure 29: View of Topics table

Lastly, I tried my best to follow agile scrum through attending all scrum daily and weekly meetings and discussed solution of every problem that we face while working our designed tasks. Follow sprint backlog and complete task within sprint.

Lesson Learnt

This assignment was my first group project and during this assignment I have learnt many things. As scrum methodology has been used to develop this project, there was a lots of new things for me to learn like user stories, sprint backlog, product backlog,

backlog prioritization using user stories, collaboration with team, process tracking using brunt-down charts, feedback on the solution, daily and weekly meetings that helps to complete this project successfully and efficiently. Sprint backlog and product backlog has been managed through asana.

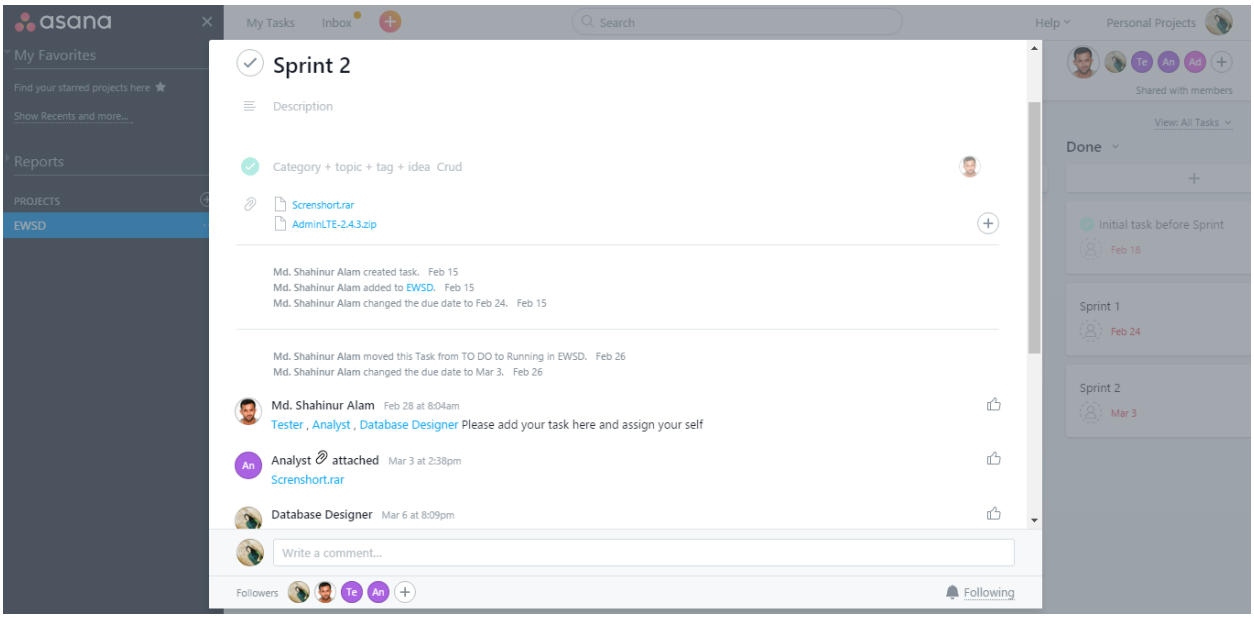

Figure 30: sprint backlog management in asana

Designing database is not easy because meaningful data make the system resourceful and easy to understand. Well-established and normalized database is must to develop a system without good database design is not possible to develop a system successfully. Learn physical database design after system developments and learn about secure role-based database design and implementation.

Conclusion

The system we have been told to develop is an enterprise web solution and it was need to complete within a short time. To complete the system within the given time we have

followed scrum methodology and split the work amongst the team. We have tried our best to complete our system as it is required through team work. Without proper team work it would not be possible to complete the system successfully. Also I have learnt a lot while working on this coursework like working on a team and following scrum methodology. In the end it could be said that it was really pleasurable working on this group project.