Project Title: Database Design and Development for Journal of E-commerce Research Knowledge

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1. Critical Evaluation of the Database System

A database is an organized and structured data collection that enables easy information management and retrieval. It is designed to effectively store and retrieve massive amounts of data to support efficient data management.

The three main parts of a typical database system are the database itself, which holds the data, a database management system (DBMS), which is the software used in maintaining the database, and the users who interact with the database to carry out various tasks. The DBMS provides a variety of functions and tools for creating, updating, and retrieving data from the database. Users are given the ability to specify the structure of the database, create connections between data elements, and apply data integrity restrictions. To ensure effective retrieval and processing of data, the DBMS also handles data organization and storage. There are various types of databases, they include;

1.1. Relational Database Management System

Since the 1970s, relational databases have been widely used in the field of computer science. They provide a well-organized and effective way to store and retrieve data. A relational database is made up of linked tables with shared characteristics. Each table has rows that represent individual records and columns that represent record attributes. Relationships between tables are established by defining keys, such as primary keys that uniquely identify rows within a table, and foreign keys used to link tables together (Date and Darwen, 2000). Maintaining data consistency across applications and database instances is a key strength of relational databases. They excel at ensuring that multiple database instances always have consistent data. Achieving this level of timely consistency with large amounts of data is challenging for other types of databases. Some modern databases, like NoSQL, offer "eventual consistency," which requires time for data synchronization (Oracle, 2014).

1.2. Non-Relational Database Management System

A non-relational database, also known as non-SQL or NoSQL, is a type of database that enables the storage and retrieval of data using methods other than the tabular relations used in relational databases (GeeksforGeeks, 2018). These databases emerged in 1998 (Quick Base, 2017).

Designed to handle and store large amounts of unstructured and semi-structured data, NoSQL databases differ from traditional relational databases that utilize tables with predefined schemas. Instead, they employ flexible data models capable of adapting to changing data structures. Additionally, NoSQL databases are horizontally scalable, enabling them to handle increasing data volumes (GeeksforGeeks, 2018).

In most NoSQL databases, there is a concept of eventual consistency, where changes to the database are gradually propagated to all nodes. As a result, queries for data may not immediately return updated information, and there is a risk of retrieving inaccurate data, a situation known as stale reads (GeeksforGeeks, 2018).

1.3. Object-Oriented Database System

An object-oriented database management system (OODBMS), also known as an ODBMS (object database management system), is a type of database management system that enables the modeling, creation, and storage of data in the form of objects. ODBMS is particularly well-suited for managing complex data relationships, offering advantages over relational database management systems (RDBMS). Accessing data with numerous relationships stored across multiple tables in an RDBMS can be more challenging for applications compared to accessing data as objects in an ODBMS (SearchOracle, n.d.).

Using an ODBMS with object-oriented programming languages like Python, Java, C++, etc., can result in a more lightweight project because the database structure closely aligns with programming objects (MongoDB, n.d.).

1.4. Cloud Database Management System

A cloud database refers to a database that is created, deployed, and accessed within a cloud environment, including private, public, or hybrid clouds. This type of database provides three primary service options:

Infrastructure as a Service (IaaS): This service grants users access to cloud-based physical and virtual servers, storage, and networking infrastructure. It serves as the backend IT infrastructure for running applications and workloads in the cloud.

Platform as a Service (PaaS): PaaS offers users a complete, pre-configured cloud-based platform for developing, running, maintaining, and managing applications. It provides a ready-to-use environment for application development and deployment.

Software as a Service (SaaS): SaaS enables users to access and use cloud-hosted application software. It allows users to utilize applications without the need for local installation or infrastructure management.

These three service types are the most popular offerings in cloud computing (IBM, 2023). Cloud databases offer several advantages, including cost savings, as users or organizations only pay for their usage, eliminating the need for infrastructure and minimizing maintenance costs (Oracle.com, 2014).

1.5. Centralized Database

In this type of database information is available through a network and is kept and controlled in a single location. Users can access the centralized computer via the network to retrieve the stored information. This type of database offers advantages such as enhanced security and data integrity, as well as reduced redundancy. Immediate access and updates to data are possible in a centralized database. The simplicity of a single database design makes it easier to manage and reduces the need for labor, power supply, and maintenance. Institutions such as enterprises, government entities, schools, and universities commonly employ centralized databases (Knowledge Base by phoenixNAP, 2021).

1.6. Distributed Database

In this type of database information is kept in distributed databases at several physical locations. The database may be spread out among several CPUs at one location or at several locations. End users perceive the data as existing in a single database because of the linkages between the distributed databases. This database type supports redundancy since other components would continue to function even if one of the servers or components went down, preventing downtime. Distributed database components join into a single conceptual database even when they are not physically connected (Knowledge Base by phoenixNAP, 2021).

1.7. Justification of Database for Case Study

The Journal of E-commerce Research Knowledge system deals with large volumes of structured data such as manuscripts, manuscript submissions, reviewers' details, author information, editor information, and editorial decisions. A relational database provides a structured and efficient way to store this data. A relational database provides data integrity by enforcing data constraints, such as ensuring that only valid data is entered into the system. This ensures that the data stored in the database is accurate and consistent, which is important for a system that relies on accurate information. In the event that reports need to be generated based on a range of metrics such as article submission rates, acceptance rates, and author demographics, which are important for tracking and evaluating the effectiveness of the system, a relational database can help with this.

Lastly, the Journal of E-commerce Research Knowledge system often deals with sensitive information such as author contact details and feedback from reviewers. A relational database provides a secure way to store this data, with features such as access controls, user authentication, and data encryption.

In summary, a relational database is an appropriate choice for the Journal of E-commerce Research Knowledge system due to its structured data storage, data integrity, flexibility, and security features.

2. Database Design

2.1. Entity Relationship Model (ERD)

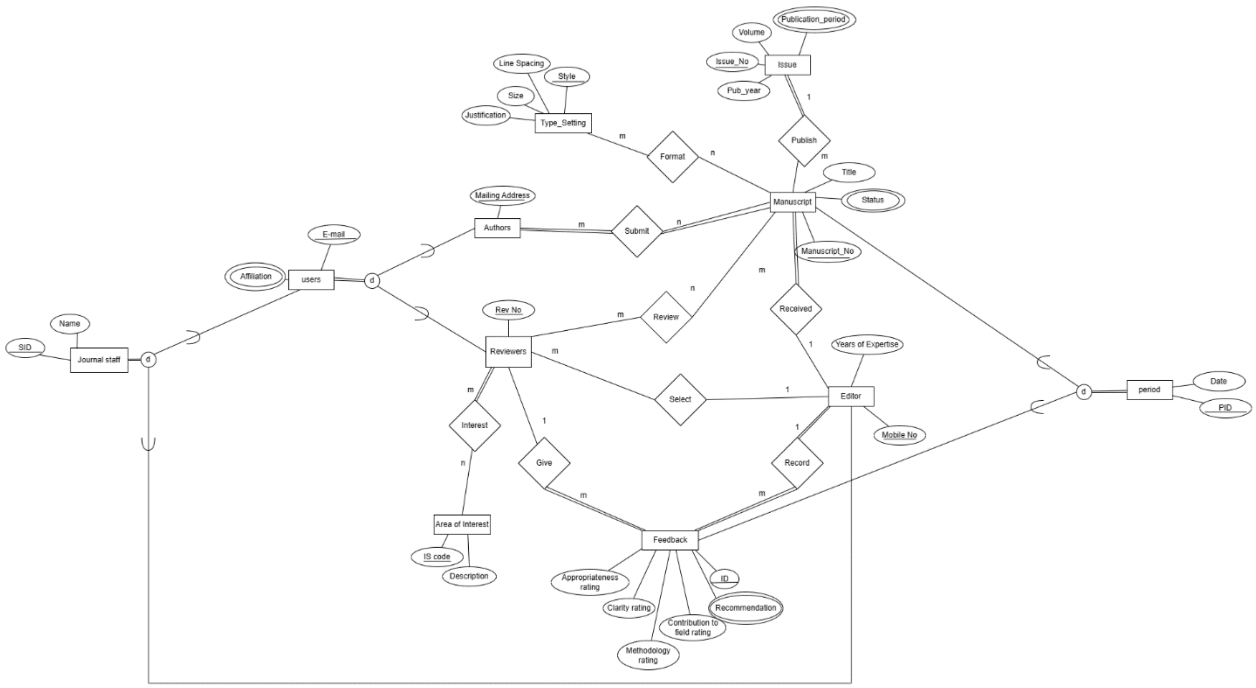

Figure 1: ERD of Journal of E-commerce Research Knowledge system

2.2. Relational Schema Mapping

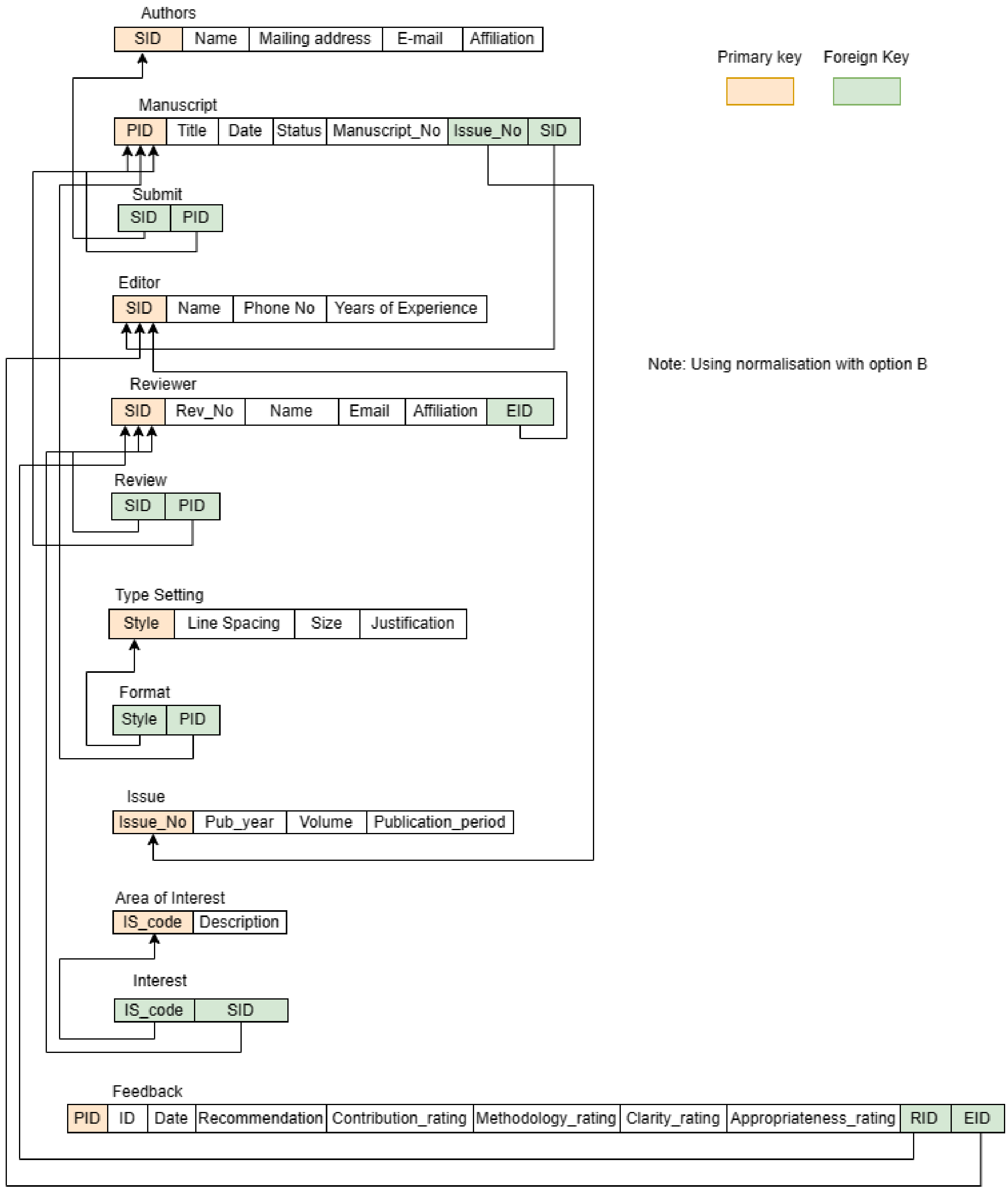

Figure 2: Schema of Journal of E-commerce Research Knowledge System

3. Database Development

3.1. Physical Design of the System

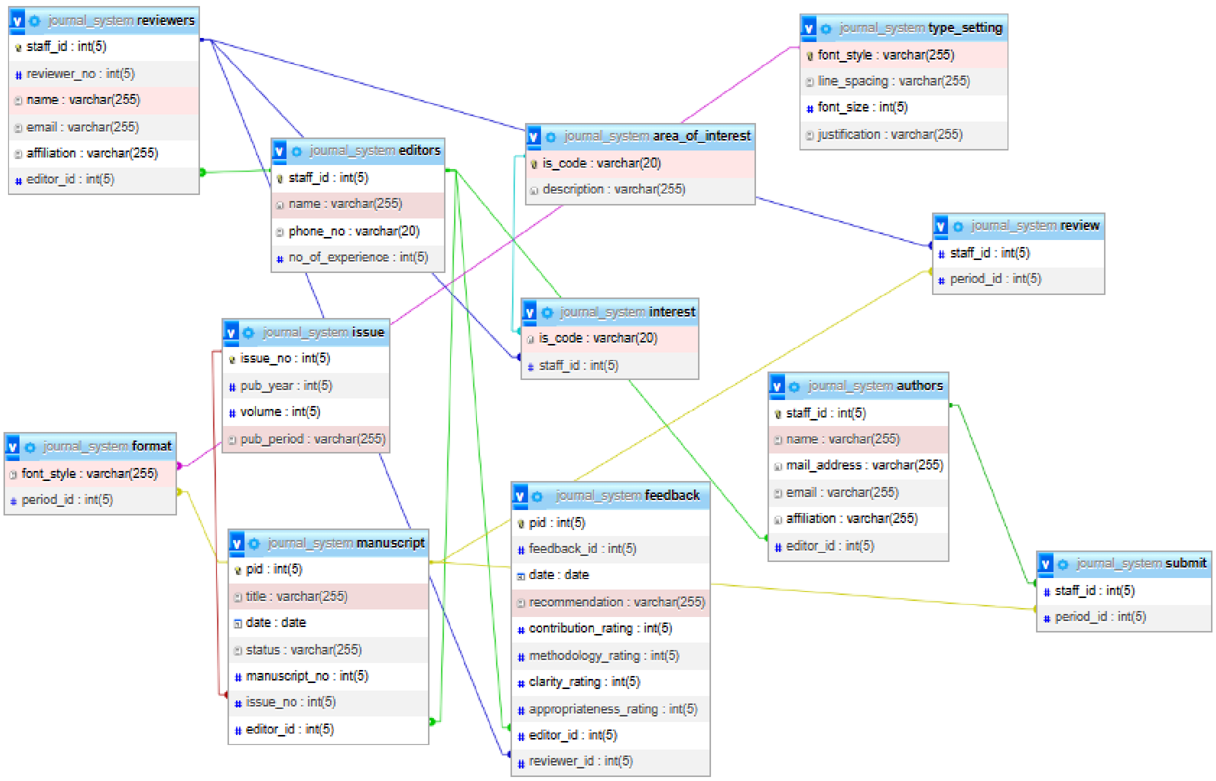

Figure 3: Database Schema and Relationship representation of the Journal System

Table	Action						Rows	Type	Collation	Size	Overhead
area_of_interest	Browse	Structure	Search	Insert	Empty	Drop	7	InnoDB	utf8mb4_general_ci	16.0 KiB	-
authors	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	32.0 KiB	-
editors	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	16.0 KiB	-
feedback	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	48.0 KiB	-
format	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	48.0 KiB	-
interest	Browse	Structure	Search	Insert	Empty	Drop	11	InnoDB	utf8mb4_general_ci	48.0 KiB	-
issue	Browse	Structure	Search	Insert	Empty	Drop	4	InnoDB	utf8mb4_general_ci	16.0 KiB	-
manuscript	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	48.0 KiB	-
review	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	48.0 KiB	-
reviewers	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	32.0 KiB	-
submit	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	48.0 KiB	-
type_setting	Browse	Structure	Search	Insert	Empty	Drop	10	InnoDB	utf8mb4_general_ci	16.0 KiB	-
12 tables	Sum						112	InnoDB	utf8mb4_general_ci	416.0 KiB	0 B

Figure 4: Design of the Journal system

3.2. Tables and Relations

3.2.1. Author Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**staff_id**	int(5)			No	*None*		AUTO_INCREMENT	Change	Drop	More
☐	2	**name**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	3	**mail_address**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	4	**email**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	5	**affiliation**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	6	**editor_id**	int(5)			No	*None*			Change	Drop	More

Figure 5: Author Entity Structure

←T→				staff_id	name	mail_address	email	affiliation	editor_id
☐	Edit	Copy	Delete	1	Noah Jones	17 Nechells Street, B723Y	noahjones@gmail.com	University of East London	3
☐	Edit	Copy	Delete	2	Ava Brown	20 High Street Newton, B19 2SS	ava.brown@gmail.com	Deloitte	1
☐	Edit	Copy	Delete	3	Isabella Davis	70 Rupert Street B93FE,Birmingham	isabella@gmail.com	Aston University	1
☐	Edit	Copy	Delete	4	Sophia Miller	20 Parliament Street, Birmingham B6 4TS	sophia.miller@gmail.com	Edinburgh University	4
☐	Edit	Copy	Delete	5	Mia Wilson	1 St Philips Place, Birmingham B3 2PP	mia.wilson@gmail.com	Schneider Electric	7
☐	Edit	Copy	Delete	6	Jackson Moore	15 Bartholomew Row, B15 3TN, Birmingham	jacksonmoore@gmail.com	Birmingham City University	6
☐	Edit	Copy	Delete	7	Aiden Taylor	62 Aton Lane B34 12T, Birmingham	aidentaylor@gmail.com	Citrix	5
☐	Edit	Copy	Delete	8	Lucas Anderson	60 Priestley street sheffield S24Ft	lucas.anderson@gmail.com	Pipedrive	8
☐	Edit	Copy	Delete	9	Harper Thomas	77 Haming Street Sheffield S13Be	harperthomas@gmail.com	Marketo	8

Figure 6: Author Entity Data

3.2.2. Editor Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**staff_id**	int(5)			No	*None*		AUTO_INCREMENT	Change	Drop	More
☐	2	**name**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	3	**phone_no**	varchar(20)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	4	**no_of_experience**	int(5)			No	*None*			Change	Drop	More

Figure 7: Editor Entity Structure

←T→				staff_id	name	phone_no	no_of_experience
☐	Edit	Copy	Delete	1	George Washington	09779927563	6
☐	Edit	Copy	Delete	2	Tyler Perry	07809339907	10
☐	Edit	Copy	Delete	3	Andrew William	07835306446	9
☐	Edit	Copy	Delete	4	Francisca Davis	07768237187	6
☐	Edit	Copy	Delete	5	Chelsea Powell	07136925787	10
☐	Edit	Copy	Delete	6	Brian Tracy	+2348064101502	11
☐	Edit	Copy	Delete	7	Jet Li	07950533779	9
☐	Edit	Copy	Delete	8	Olivia Smith	07025672211	12
☐	Edit	Copy	Delete	9	Liam Johnson	+2348064103489	11
☐	Edit	Copy	Delete	10	Emma Williams	07013672217	16

Figure 8: Editor Entity Data

3.2.3. Reviewer Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**staff_id**	int(5)			No	*None*		AUTO_INCREMENT	Change	Drop	More
☐	2	**reviewer_no**	int(5)			No	*None*			Change	Drop	More
☐	3	**name**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	4	**email**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	5	**affiliation**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	6	**editor_id**	int(5)			No	*None*			Change	Drop	More

Figure 9: Reviewer Entity Structure

←T→				staff_id	reviewer_no	name	email	affiliation	editor_id
☐	Edit	Copy	Delete	1	101	Charlotte White	charlottewhite@gmail.com	University of East London	3
☐	Edit	Copy	Delete	2	102	James Harris	harris.james@gmail.com	RingLead	5
☐	Edit	Copy	Delete	3	103	Benjamin Martin	benjamin.martin@gmail.com	Delcam plc	8
☐	Edit	Copy	Delete	4	104	Amelia Thompson	ameliathompson@gmail.com	Kalexiko ltd	6
☐	Edit	Copy	Delete	5	105	Oliver Garcia	oliver.garcia@gmail.com	Delcam plc	7
☐	Edit	Copy	Delete	6	106	Evelyn Martinez	martinezeve@gmail.com	Barclays	3
☐	Edit	Copy	Delete	7	107	William Robinson	william.robinson@gmail.com	Aston University	6
☐	Edit	Copy	Delete	8	108	Abigail Clark	abigail.clark@gmail.com	Compass Group	1
☐	Edit	Copy	Delete	9	109	Michael Rodriguez	michaelrodriguez@gmail.com	Unilever	4
☐	Edit	Copy	Delete	10	120	Emily Lewis	emilylewis@gmail.com	Birmingham City University	4

Figure 10: Reviewer Entity Data

3.2.4. Area of Interest Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**is_code**	varchar(20)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	2	**description**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More

Figure 11: Area of Interest Entity Structure

←T→				is_code	description
☐	Edit	Copy	Delete	IS2020	Accounting
☐	Edit	Copy	Delete	IS2070	Health and Fitness
☐	Edit	Copy	Delete	IS2100	Software Development
☐	Edit	Copy	Delete	IS2367	Brain Psychology
☐	Edit	Copy	Delete	IS2378	Business Analysis
☐	Edit	Copy	Delete	IS2400	Molecular Biology
☐	Edit	Copy	Delete	IS2440	Database Development

Figure 12: Area of Interest Entity Data

3.2.5. Interest (Relationship Between Reviewer and Area of Interest)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
	1	**is_code**	varchar(20)	utf8mb4_general_ci		No	*None*			Change	Drop	More
	2	**staff_id**	int(5)			No	*None*			Change	Drop	More

Figure 13: Interest Table Structure

is_code	staff_id
IS2100	1
IS2070	2
IS2020	3
IS2100	4
IS2367	5
IS2378	6
IS2400	7
IS2440	6
IS2020	8
IS2070	9
IS2100	10

Figure 14: Interest Table Data

3.2.6. Issue Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
	1	**issue_no**	int(5)			No	*None*		AUTO_INCREMENT	Change	Drop	More
	2	**pub_year**	int(5)			No	*None*			Change	Drop	More
	3	**volume**	int(5)			No	*None*			Change	Drop	More
	4	**pub_period**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More

Figure 15: Issue Entity Structure

←T→				issue_no	pub_year	volume	pub_period
	Edit	Copy	Delete	1	2023	2	fall
	Edit	Copy	Delete	2	2020	1	winter
	Edit	Copy	Delete	3	2021	5	spring
	Edit	Copy	Delete	4	2022	4	summer

Figure 16: Issue Entity Data

3.2.7. Manuscript Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
	1	**pid**	int(5)			No	*None*		AUTO_INCREMENT	Change	Drop	More
	2	**title**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
	3	**date**	date			No	*None*			Change	Drop	More
	4	**status**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
	5	**manuscript_no**	int(5)			No	*None*			Change	Drop	More
	6	**issue_no**	int(5)			No	*None*			Change	Drop	More
	7	**editor_id**	int(5)			No	*None*			Change	Drop	More

Figure 17: Manuscript Entity Structure

←T→			pid	title	date	status	manuscript_no	issue_no	editor_id
Edit	Copy	Delete	1	Management Reporting & Analysis	2020-01-16	received	15267	2	1
Edit	Copy	Delete	2	Healthy eating habits you want to teach your kids ...	2021-04-06	under review	17289	3	7
Edit	Copy	Delete	3	The evolution of software development orchestratio...	2020-07-20	accepted	13893	2	5
Edit	Copy	Delete	4	The Role of Genetics in Mental Health	2020-11-16	accepted	16745	2	2
Edit	Copy	Delete	5	Exploring the Role of Technology in Modern-Day Cri...	2022-03-23	scheduled	24595	4	8
Edit	Copy	Delete	6	Data Analytics Management Capability and Strategie...	2023-05-08	published	23897	1	4
Edit	Copy	Delete	7	Intelligent Agents and Agent-based Applications	2022-09-14	rejected	31267	4	3
Edit	Copy	Delete	8	Applications of Modern Molecular Biology in Vaccin...	2023-02-06	published	48967	1	3
Edit	Copy	Delete	9	Maternal Vaccination to Prevent Adverse Pregnancy ...	2022-09-14	under review	41278	4	7
Edit	Copy	Delete	10	Designing a Data Mining Process for the Financial ...	2020-08-20	received	49237	2	8

Figure 18: Manuscript Entity Data

3.2.8. Review Table (Relation between Reviewer and Manuscript)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**staff_id**	int(5)			No	*None*			Change	Drop	More
☐	2	**period_id**	int(5)			No	*None*			Change	Drop	More

Figure 19: Review Table Structure

staff_id	period_id
3	1
4	2
6	3
7	5
8	6
9	8
10	1
1	2
2	3
3	5

Figure 20: Review Table Data

3.2.9. Feedback Entity

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action
☐	1	**pid**	int(5)			No	*None*			Change Drop More
☐	2	**feedback_id**	int(5)			No	*None*			Change Drop More
☐	3	**date**	date			No	*None*			Change Drop More
☐	4	**recommendation**	varchar(255)	utf8mb4_general_ci		No	*None*			Change Drop More
☐	5	**contribution_rating**	int(5)			No	*None*			Change Drop More
☐	6	**methodology_rating**	int(5)			No	*None*			Change Drop More
☐	7	**clarity_rating**	int(5)			No	*None*			Change Drop More
☐	8	**appropriateness_rating**	int(5)			No	*None*			Change Drop More
☐	9	**editor_id**	int(5)			No	*None*			Change Drop More
☐	10	**reviewer_id**	int(5)			No	*None*			Change Drop More

Figure 21: Feedback Entity Structure

←T→	pid	feedback_id	date	recommendation	contribution_rating	methodology_rating	clarity_rating	appropriateness_rating	editor_id	reviewer_id
☐ Edit Copy Delete	1	419	2021-10-13	accepted	5	7	6	7	1	3
☐ Edit Copy Delete	2	327	2021-04-12	reject	6	5	4	5	2	6
☐ Edit Copy Delete	3	217	2022-10-20	accept	8	7	8	6	7	6
☐ Edit Copy Delete	4	367	2023-05-10	accepted	8	9	7	7	5	2
☐ Edit Copy Delete	5	498	2022-12-05	accepted	8	7	7	8	4	5
☐ Edit Copy Delete	6	537	2021-08-18	rejected	4	3	5	4	3	2
☐ Edit Copy Delete	7	834	2023-05-16	rejected	3	6	5	4	6	1
☐ Edit Copy Delete	8	586	2022-11-18	accept	7	9	8	9	7	2
☐ Edit Copy Delete	9	456	2023-02-09	accept	7	8	9	8	9	10
☐ Edit Copy Delete	10	298	2022-11-21	accept	8	7	7	8	1	10

Figure 22: Feedback Entity Data

3.2.10. Type Setting

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	font_style	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	2	line_spacing	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	3	font_size	int(5)			No	*None*			Change	Drop	More
☐	4	justification	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More

Figure 23: Type Setting Structure

←T→				font_style	line_spacing	font_size	justification
☐	Edit	Copy	Delete	Agency FB	Tight	18	Right
☐	Edit	Copy	Delete	Arial	Open	24	Left
☐	Edit	Copy	Delete	Bahnschrift	Open	32	Center
☐	Edit	Copy	Delete	Berlin Sans FB	Relaxed	30	Left
☐	Edit	Copy	Delete	Calibri	No paragraph space	14	Left
☐	Edit	Copy	Delete	Elephant	No paragraph space	14	Left
☐	Edit	Copy	Delete	Franklin Gothic Book	Compact	12	Center
☐	Edit	Copy	Delete	Georgia	Relaxed	26	Center
☐	Edit	Copy	Delete	Stencil	Double	28	Right
☐	Edit	Copy	Delete	Times New Roman	Compact	20	Center

Figure 24: Type Setting Data

3.2.11. Format (Relation between Type Setting and Manuscript)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
☐	1	**font_style**	varchar(255)	utf8mb4_general_ci		No	*None*			Change	Drop	More
☐	2	**period_id**	int(5)			No	*None*			Change	Drop	More

Figure 25: Format Table Structure

font_style	period_id
Calibri	1
Arial	10
Bahnschrift	3
Berlin Sans FB	4
Elephant	5
Franklin Gothic Book	7
Stencil	8
Georgia	3
Calibri	10
Berlin Sans FB	3

Figure 26: Format Table Data

3.2.12. Submit Table (Relation between Author and Manuscript)

	#	Name	Type	Collation	Attributes	Null	Default	Comments	Extra	Action		
	1	**staff_id**	int(5)			No	*None*			Change	Drop	More
	2	**period_id**	int(5)			No	*None*			Change	Drop	More

Figure 27: Submit Table Structure

staff_id	period_id
7	1
2	3
7	5
2	4
3	4
4	5
6	7
8	8
1	9
4	2

Figure 28: Submit Table Data

3.3. Queries Examples

1. Select Reviewers who have more than one Area of Interests

Showing rows 0 - 0 (1 total, Query took 0.0008 seconds.)

```sql
SELECT reviewers.name,count(interest.is_code) as no_of_interest FROM reviewers,interest,area_of_interest WHERE reviewers.staff_id = interest.staff_id and interest.is_code = area_of_interest.is_code GROUP by reviewers.staff_id order by no_of_interest DESC limit 1;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Extra options

	name	no_of_interest
Edit Copy Delete	Evelyn Martinez	2

Figure 29: Query to get Reviewer with more than one Area of Interest

2. Select the title of the Manuscripts that have a feedback recommendation of ‘reject’

Showing rows 0 - 2 (3 total, Query took 0.0016 seconds.)

```sql
SELECT manuscript.title, feedback.recommendation from manuscript, feedback, editors WHERE manuscript.editor_id = editors.staff_id and editors.staff_id = feedback.editor_id and feedback.recommendation = 'reject';
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table

Extra options

title	recommendation
The Role of Genetics in Mental Health	reject
Intelligent Agents and Agent-based Applications	reject
Applications of Modern Molecular Biology in Vaccin...	reject

Figure 30: SQL query showing Manuscripts with feedback of reject

3. Select the Authors who wrote more than one Manuscript

Showing rows 0 - 2 (3 total, Query took 0.0009 seconds.)

```sql
select authors.name, COUNT(manuscript.pid) as no_of_manuscript from authors, manuscript, submit WHERE authors.staff_id = submit.staff_id and submit.period_id = manuscript.pid group by authors.staff_id order by no_of_manuscript DESC LIMIT 3;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Extra options

name	no_of_manuscript 1
Aiden Taylor	2
Ava Brown	2
Sophia Miller	2

Figure 31: SQL, query showing Authors who wrote more than one manuscript

4. Select the most used Format style

✔ Showing rows 0 - 1 (2 total, Query took 0.0016 seconds.)

```
select type_setting.font_style, count(manuscript.pid) from type_setting,format,manuscript where type_setting.font_style =format.font_style
and format.period_id = manuscript.pid group by format.font_style order by count(manuscript.pid) DESC LIMIT 2;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Extra options

←T→	font_style	count(manuscript.pid) 1
Edit Copy Delete	Calibri	2
Edit Copy Delete	Berlin Sans FB	2

Figure 32: SQL query showing the most used font style

5. Select the Manuscript that was written by more than one Author

✔ Showing rows 0 - 1 (2 total, Query took 0.0007 seconds.)

```
SELECT manuscript.title, count(authors.staff_id) as no_of_authors from authors, submit, manuscript WHERE authors.staff_id = submit.staff_id
and submit.period_id = manuscript.pid group by submit.period_id order by no_of_authors DESC limit 2;
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Extra options

←T→	title	no_of_authors 1
Edit Copy Delete	Exploring the Role of Technology in Modern-Day Cri...	2
Edit Copy Delete	The Role of Genetics in Mental Health	2

Figure 33: SQL query showing Manuscripts with more than one Author

6. Select Reviewers that are yet to give feedback

✔ Showing rows 0 - 3 (4 total, Query took 0.0008 seconds.)

```
SELECT reviewers.name, reviewers.staff_id from reviewers where reviewers.staff_id not in (SELECT feedback.reviewer_id from feedback);
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

←T→	name	staff_id
Edit Copy Delete	Amelia Thompson	4
Edit Copy Delete	William Robinson	7
Edit Copy Delete	Abigail Clark	8
Edit Copy Delete	Michael Rodriguez	9

Figure 34: SQL query showing Reviewers without Feedback

7. Select Manuscripts that don’t have reviewers

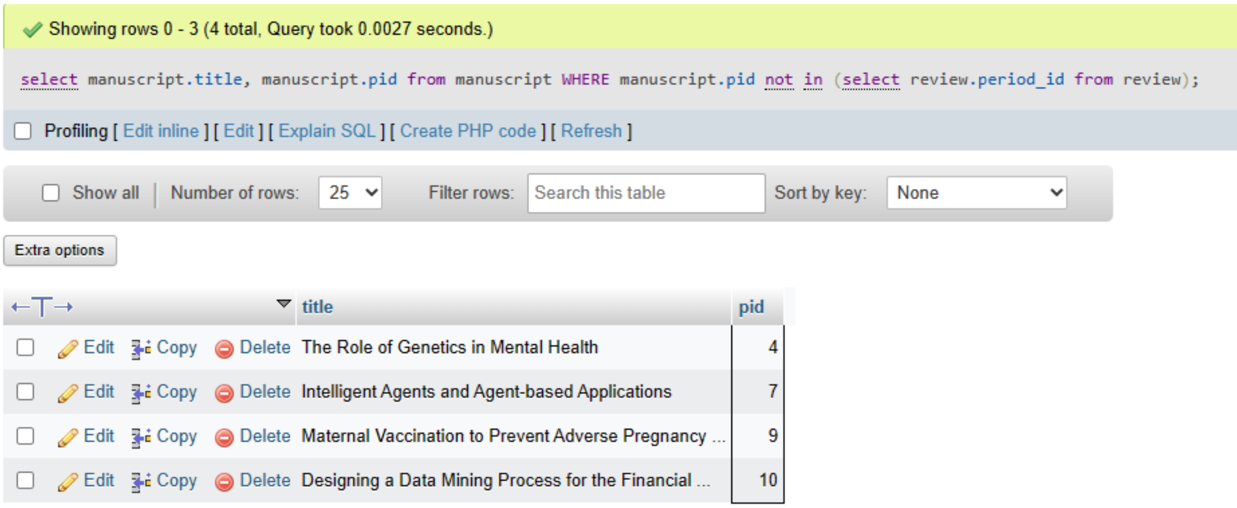

Figure 35: SQL query showing Manuscripts without Reviewers

8. Select the Editors that are yet to select Reviewers

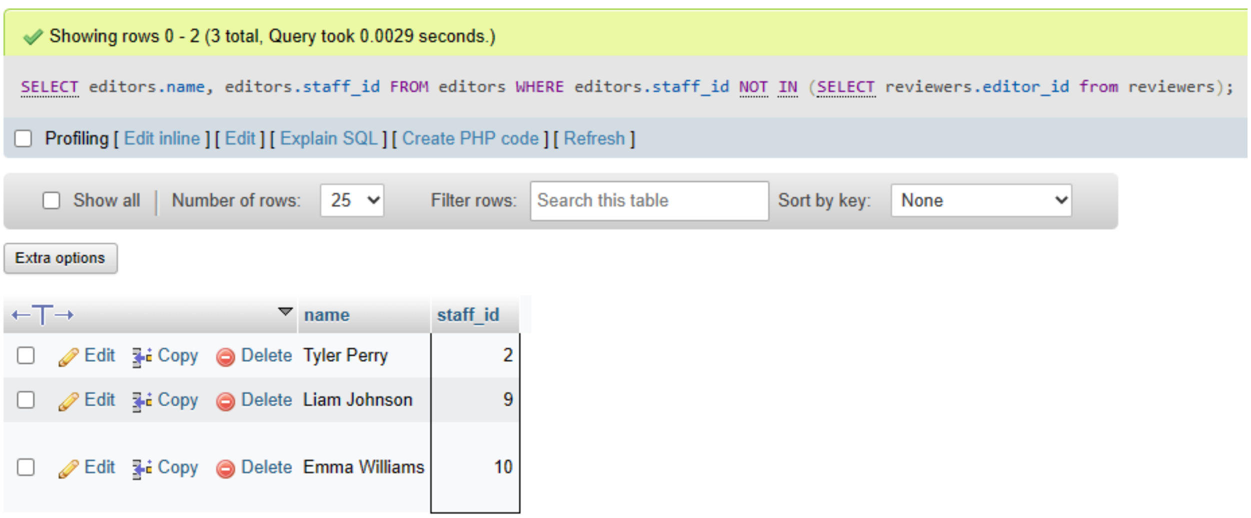

Figure 36: SQL query showing Editors without Reviewers

9. Select a Reviewer that has 'James' in his/her name

✔ Showing rows 0 - 0 (1 total, Query took 0.0030 seconds.)

```
SELECT reviewers.* from reviewers WHERE reviewers.name LIKE '%James%';
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table

Extra options

←T→	staff_id	reviewer_no	name	email	affiliation	editor_id
Edit Copy Delete	2	102	James Harris	harris.james@gmail.com	RingLead	5

Figure 37: SQL Query showing a Reviewer with the name James

10. Select all the Manuscripts with a published status

✔ Showing rows 0 - 2 (3 total, Query took 0.0005 seconds.)

```
SELECT manuscript.* FROM `manuscript` where status = 'published';
```

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

Extra options

←T→	pid	title	date	status	manuscript_no	issue_no	editor_id
Edit Copy Delete	6	Data Analytics Management Capability and Strategie...	2023-05-08	published	23897	1	4
Edit Copy Delete	8	Applications of Modern Molecular Biology in Vaccin...	2023-02-06	published	48967	1	3
Edit Copy Delete	9	Maternal Vaccination to Prevent Adverse Pregnancy ...	2022-09-14	published	41278	4	7

Figure 38: SQL query showing all Manuscripts with 'published' status

4. Security Scenario

To guarantee the security of the system, several users with a variety of privilege and access to the database are created.

4.1. Creating Users

Different users are created for the system.

```sql
CREATE user 'admin_Paul'@'localhost' IDENTIFIED BY 'abc';
CREATE user 'user01_Ken'@'localhost' IDENTIFIED BY 'abc';
CREATE user 'user02_Jane'@'localhost' IDENTIFIED BY 'abc';
CREATE user 'user03_Tom'@'localhost' IDENTIFIED BY 'abc';
```

Figure 39: SQL query to create different users for the Journal System

4.2. Assigning Privileges

The different users are granted several accesses to the system based on their activities in the system.

```sql
GRANT ALL PRIVILEGES ON journal_system TO 'admin_Paul'@'localhost' WITH GRANT OPTION;

GRANT SELECT ON journal_system.editors TO 'user01_Ken'@'localhost';
GRANT SELECT ON journal_system.feedback TO 'user01_Ken'@'localhost';
GRANT SELECT, UPDATE, INSERT ON journal_system.reviewers TO 'user01_Ken'@'localhost';
GRANT SELECT, UPDATE, INSERT ON journal_system.manuscript TO 'user01_Ken'@'localhost';

GRANT SELECT ON journal_system.reviewers TO 'user02_Jane'@'localhost';
GRANT SELECT ON journal_system.manuscript TO 'user02_Jane'@'localhost';
GRANT SELECT ON journal_system.interest TO 'user02_Jane'@'localhost';
GRANT SELECT, INSERT, UPDATE ON journal_system.interest TO 'user02_Jane'@'localhost';

GRANT SELECT ON journal_system.authors TO 'user03_Tom'@'localhost';
GRANT SELECT, INSERT ON journal_system.manuscript TO 'user03_Tom'@'localhost';
```

Figure 40: SQL query granting privileges to the created users

4.3. To check Account Privileges

1. Privilege check for ‘admin_Paul’

```
MariaDB [(none)]> show grants for 'admin_Paul'@'localhost';
+------------------------------------------------------------------------------------------------------------------+
| Grants for admin_Paul@localhost                                                                                  |
+------------------------------------------------------------------------------------------------------------------+
| GRANT USAGE ON *.* TO `admin_Paul`@`localhost` IDENTIFIED BY PASSWORD '*0D3CED9BEC10A777AEC23CCC353A8C08A633045E' |
| GRANT ALL PRIVILEGES ON `journal_system`.* TO `admin_Paul`@`localhost` WITH GRANT OPTION                         |
+------------------------------------------------------------------------------------------------------------------+
2 rows in set (0.000 sec)

MariaDB [(none)]>
```

Figure 41: Check showing access granted to 'admin_Paul'

2. Privilege check for ‘user01_Ken’

```
MariaDB [(none)]> show grants for 'user01_Ken'@'localhost';
+------------------------------------------------------------------------------------------------------------------+
| Grants for user01_Ken@localhost                                                                                  |
+------------------------------------------------------------------------------------------------------------------+
| GRANT USAGE ON *.* TO `user01_Ken`@`localhost` IDENTIFIED BY PASSWORD '*0D3CED9BEC10A777AEC23CCC353A8C08A633045E' |
| GRANT SELECT ON `journal_system`.`editors` TO `user01_Ken`@`localhost`                                          |
| GRANT SELECT, INSERT, UPDATE ON `journal_system`.`manuscript` TO `user01_Ken`@`localhost`                       |
| GRANT SELECT, INSERT, UPDATE ON `journal_system`.`reviewers` TO `user01_Ken`@`localhost`                        |
| GRANT SELECT ON `journal_system`.`feedback` TO `user01_Ken`@`localhost`                                         |
+------------------------------------------------------------------------------------------------------------------+
5 rows in set (0.001 sec)
```

Figure 42: Check showing access granted to 'user01_Ken'

3. Privilege check for ‘user02_Jane’

```
MariaDB [(none)]> show grants
    -> ;
+-------------------------------------------------------------------------------------------------------------------+
| Grants for user02_Jane@localhost                                                                                  |
+-------------------------------------------------------------------------------------------------------------------+
| GRANT USAGE ON *.* TO `user02_Jane`@`localhost` IDENTIFIED BY PASSWORD '*0D3CED9BEC10A777AEC23CCC353A8C08A633045E' |
| GRANT SELECT ON `journal_system`.`manuscript` TO `user02_Jane`@`localhost`                                       |
| GRANT SELECT ON `journal_system`.`reviewers` TO `user02_Jane`@`localhost`                                        |
| GRANT SELECT, INSERT, UPDATE ON `journal_system`.`interest` TO `user02_Jane`@`localhost`                         |
+-------------------------------------------------------------------------------------------------------------------+
4 rows in set (0.000 sec)
```

Figure 43: Check showing access granted to 'user02_Jane'

4. Privilege check for ‘user03_Tom’

```
MariaDB [(none)]> show grants for 'user03_Tom'@'localhost';
+------------------------------------------------------------------------------------------------------------------+
| Grants for user03_Tom@localhost                                                                                  |
+------------------------------------------------------------------------------------------------------------------+
| GRANT USAGE ON *.* TO `user03_Tom`@`localhost` IDENTIFIED BY PASSWORD '*0D3CED9BEC10A777AEC23CCC353A8C08A633045E' |
| GRANT SELECT ON `journal_system`.`authors` TO `user03_Tom`@`localhost`                                          |
| GRANT SELECT, INSERT ON `journal_system`.`manuscript` TO `user03_Tom`@`localhost`                               |
+------------------------------------------------------------------------------------------------------------------+
3 rows in set (0.000 sec)

MariaDB [(none)]>
```

Figure 44: Check showing access granted to 'user03_Tom'

5. Result when ‘user02_Jane’ performs an operation she does not have privilege to and when she performs operation, she has access to.

```
MariaDB [(none)]> select * from journal_system.authors
    -> ;
ERROR 1142 (42000): SELECT command denied to user 'user02_Jane'@'localhost' for table `journal_system`.`authors`
MariaDB [(none)]> select * from journal_system.reviewers limit 3;
+----------+-------------+---------------------+-------------------------+-------------------------+-----------+
| staff_id | reviewer_no | name                | email                   | affiliation             | editor_id |
+----------+-------------+---------------------+-------------------------+-------------------------+-----------+
|        1 |         101 |
Charlotte White

 | charlottewhite@gmail.com  | University of East London |         3 |
|        2 |         102 | James Harris
        | harris.james@gmail.com    | RingLead                |         5 |
|        3 |         103 | Benjamin Martin
     | benjamin.martin@gmail.com | Delcam plc              |         8 |
+----------+-------------+---------------------+-------------------------+-------------------------+-----------+
3 rows in set (0.001 sec)

MariaDB [(none)]>
```

Figure 45: Showing operation performance by 'user02_Jane'

6. Result when ‘user03_Tom’ performs an operation he has privilege to and when he performs operation, he does not have access to.

```
MariaDB [(none)]> select * from journal_system.authors limit 3;
+----------+---------------------+-------------------------------+--------------------+--------------------------+-----------+
| staff_id | name                | mail_address                  | email              | affiliation              | editor_id |
+----------+---------------------+-------------------------------+--------------------+--------------------------+-----------+
|        1 |
Noah Jones

      | 17 Nechells Street, B723Y         | noahjones@gmail.com | University of East London |         3 |
|        2 |
Ava Brown

      | 20 High Street Newton, B19 2SS
  | ava.brown@gmail.com | Deloitte                |         1 |
|        3 |
 Isabella Davis

 | 70 Rupert Street B93FE,Birmingham | isabella@gmail.com  | Aston University         |         1 |
+----------+---------------------+-------------------------------+--------------------+--------------------------+-----------+
3 rows in set (0.000 sec)

MariaDB [(none)]> update journal_system.authors set email='Noah1' where staff_id=17;
ERROR 1142 (42000): UPDATE command denied to user 'user03_Tom'@'localhost' for table `journal_system`.`authors`
MariaDB [(none)]> Bye
```

Figure 46: Showing operation performance by 'user03_Tom'

5. Conclusion

For the Journal system we used the relational database due to its structured data storage, data integrity, flexibility, security features, and also its ability for linking tables through foreign and primary keys. An Entity Relational Diagram (ERD) and a Relational Schema Mapping to better visualize the relationships and the entities created. Sample SQL queries were created to check the structures and relationship between several tables in the database. Lastly various users were created and privileges assigned so as to demonstrate how the system can be secured.

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