CS 353 - Database Systems

Project Design Report

PURE DIGITAL LIBRARY

Group 4

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1. Revised E/R

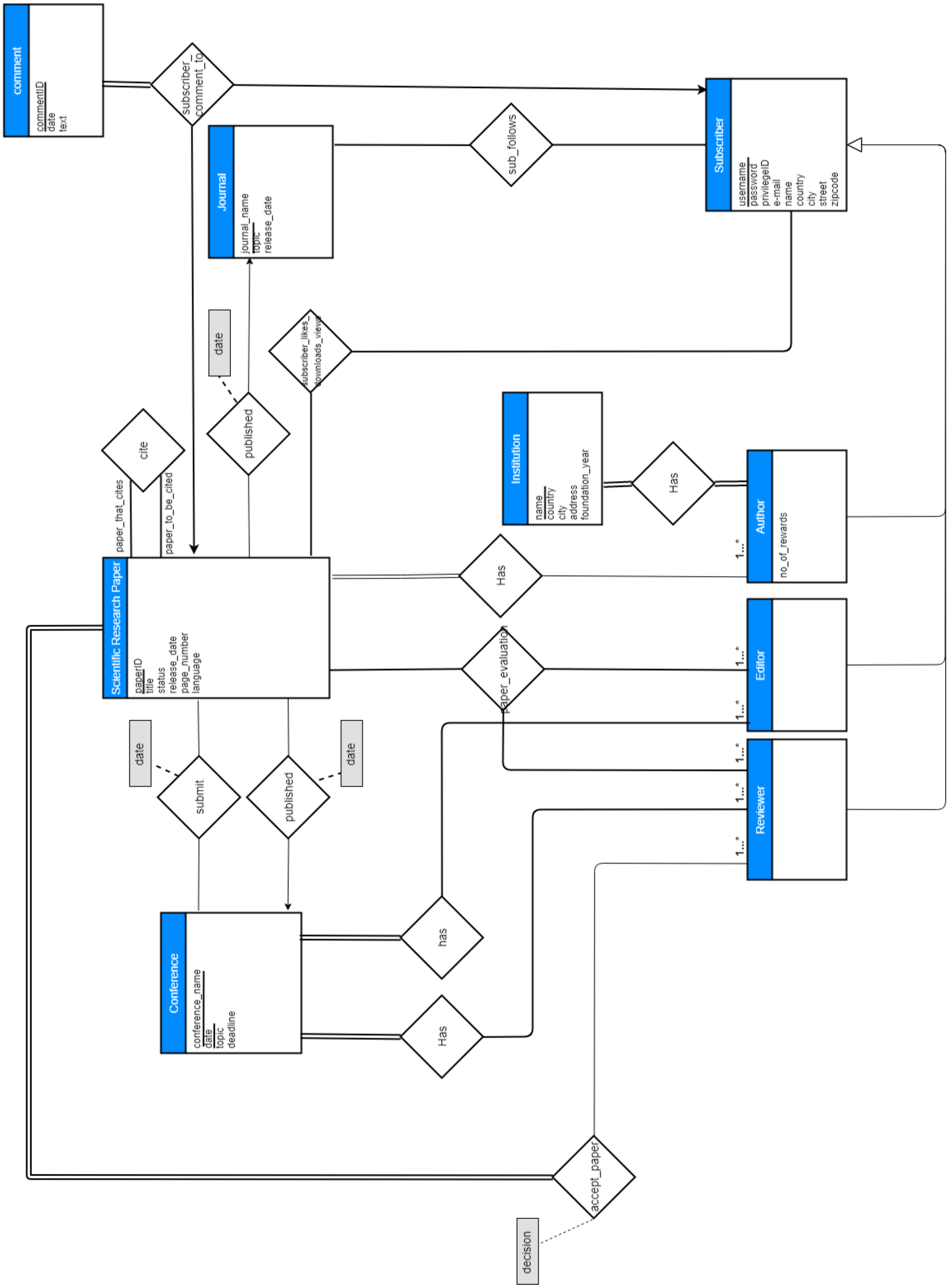


Figure 1 Revised Entity Diagram

According to the TA's feedback, we made the following changes in our ER diagram:

- We removed the person entity and merged it with the subscriber entity. So, we transferred the attributes of the person entity into subscriber.
- We removed the Identity Entity and added this as an attribute named privilegID into the subscriber entity.
- We removed the Teacher and Student entities because they has no specific attributes and were unnecessary.
- Instead of keeping the comment count inside the Scientific Research Paper identity, we added a new entity named comment. Since a subscriber could make only a single comment for a specific paper, we connected the Subscriber, Comment and Scientific Research Paper entities with a ternary relationship where the comment has total participation and the Subscriber and Scientific Research Paper entities have a one to many relation with the Comment entity.
- We removed the Journal Subscriber entity and connected the Journal and Subscriber with a sub_follows relation. This relation is a many to many relation since a subscriber can follow multiple journals.
- We changed the cardinality between the Institution and the Author entities with full participation because in our database an Author must belong to an institution and an Institution's information is only kept if an author belong to that institution.
- We added a subscriber_likes_downloads_views relation between the Subscriber and Scientific Research Paper which keeps the information of whether the subscriber liked, downloaded or viewed a paper in single tuple. The relation is many to many because a subscriber could like, download and view many papers.
- We added a date attribute to the published relations between the Scientific Research Paper-conference and Scientific Research Paper-Journal relations. We also added a date attribute to the submit relation between Scientific Research Paper-Conference since the date of these relations are important.

- We added a cite relation to Scientific Research Paper which turns back to itself. This relation is needed because in out library the author will be able to select which papers to cite.
- We removed the Editor Team entity and instead connected the Editor entity with the Conference entity with a relation named has.
- We added a ternary relationship between Scientific Research Paper, Editor and Reviewer. This relation keeps the information of which editor assigned which reviewer to which Scientific Research Paper.
- We removed the Acceptance entity and instead connected the Reviewer to the Scientific Research Paper with a relation named accept_paper. This relation has an attribute named decision which corresponds to the decision the reviewer makes to a paper.

2. Table Schemas

```
create table subscriber (
        username        varchar(20) primary key,
        password        varchar(20) not null,
        privilegedID    int,
        email           varchar(40) not null,
        name            varchar(40) not null,
        country         varchar(30),
        city            varchar(40),
        street          varchar(40),
        zip-code        int
);
```

```
create table scientific_research_paper (
        paperID                         int primary key,
        title                   varchar(100) not null,
        status                  varchar(10) not null,
        page_number             int ,
        language                varchar(20),
        release_date            varchar(10)
);
```

```
create table journal (
        journal_name            varchar(40) primary key,
        topic                   varchar(15),
        release_date            varchar(10)
);
```

```
create table conference (
        conference_name     varchar(40),
        date                varchar(10),
        topic               varchar(15),
        deadline            varchar(10),
        primary key (conference_name, date)
);



create table paper_publish_journal (
        paperID                      int primary key,
        journal_name        varchar(40),
        publication_date    varchar(10),
        foreign key (journal_name) references journal,
        foreign key (paperID) references scientific_research_paper
);



create table paper_publish_conference (
        paperID                      int primary key,
        conference_name     varchar(40),
        publication_date    varchar(10),
        foreign key (conference _name) references conference,
        foreign key (paperID) references scientific_research_paper
);



create table institution (
        institution_name    varchar(40) primary key,
        foundation_year     varchar(10),
        country             varchar(30),
        city                varchar(40),
        street              varchar(40),
        zip-code            int
);
```

```
create table  subscriber_comment_paper (
        date            varchar(10),
        text            varchar(140),
        username        varchar(20),
        paperID                 int,
        primary key (paperID, username),
        foreign key ( username) references subscriber,
        foreign key (paperID) references scientific_research_paper
);
```

```
create table subscriber_follows_journal (
        username                varchar(20),
        journal_name            varchar(40),
        primary key (username, journal_name)
);
```

```
create table subscriber_likes_downloads_views_paper (
        username                varchar(20),
        paperID                         int,
        isDownloaded            int,
        isLiked                 int,
        isViewed                int,
        primary key (username, paperID)
        foreign key (username) references subscriber (username)
        foreign key (paperID) references scientific_research_paper (paperID)
);
```

```
create table author_institution (
        username              varchar(20),
        institution_name      varchar(40),
        primary key (username, institution_name)
);
```

```
create table author_has_paper (
        username              varchar(20),
        paperID                       int,
        primary key (username, paperID)
);
```

```
create table paper_citation (
        paper_that_cites      int,
        paper_to_be_cited     int,
        foreign key (paper_that_cites, paper_to_be_cited) references
scientific_research_paper,
        primary key (paper_that_cites, paper_to_be_cited)
);
```

```
create table paper_submit_conference (
        conference_name       varchar(40),
        paperID                       int,
        date                          varchar(40),
        foreign key (paperID ) references scientific_research_paper,
        foreign key (conference_name) references conference,
        primary key (conference_name, paperID )
);
```

```
create table conference_reviewer (
        username                varchar(20),
        conference_name         varchar(40),
        primary key (conference_name, username)
        foreign key (conference_name) references conference,
        foreign key (username) references subscriber
);



create table  conference_editor (
        username                varchar(20),
        conference_name         varchar(40),
        primary key (conference_name, username)
        foreign key (conference_name) references conference,
        foreign key (username) references subscriber
);



create table  paper_evaluation (
        reviewer_username               varchar(20),
        editor_username                 varchar(20),
        paperID                                 int,
        primary key (reviewer_username, editor_username),
        foreign key (reviewer_username, editor_username) references subscriber
        foreign key (paperID ) references scientific_research_paper
);


create table  paper_acceptance (
        reviewer_username               varchar(20),
        paperID                         int,
        decision                int,
        primary key  (username, paperID),
        foreign key (reviewer_username) references subscriber,
        foreign key (paperID ) references scientific_research_paper
);
```

3. Functional Components

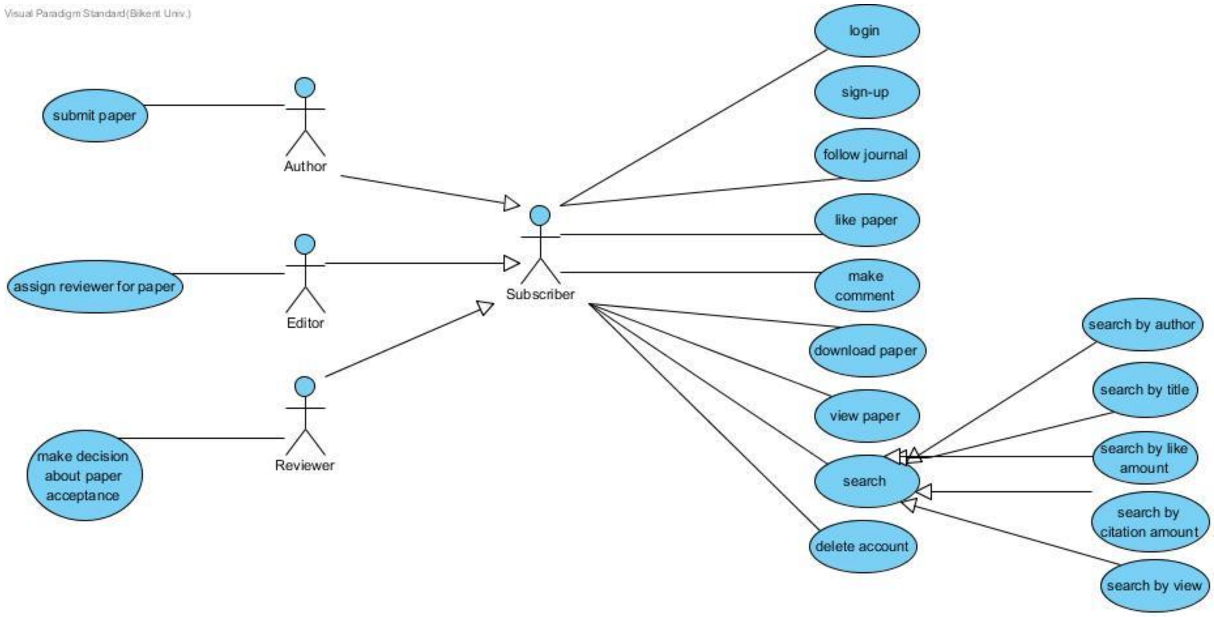


Figure 2 Use Case Diagram

In Pure Digital Library,there are three types of users that are author, editor, reviewer. All of them is a child of subscriber. They have same duties as a subscriber and also other duties that are special for them. Users should register and login to the system to use it.

3.1 Use Cases/Scenarios

3.1.1 Author

- Author can submit paper to the reviewer to be reviewed.

3.1.2 Editor

- Editor can assign the submitted paper by author and decide whether it will be published or not.

3.1.3 Reviewer

- Reviewers should be able to decide whether the source will be published or not.

3.1.4 Subscriber

- Subscriber can login into the library with username, password.
- Subscriber can sign-up into the library with username, password, email, name, country, city, street, zip-code.
- Subscriber can delete his/her library account by clicking delete button.
- Subscriber can follow a journal that if the paper has been published in a journal
- Subscriber can like a paper by clicking the like paper.
- Subscriber can make a comment to the paper.
- Subscriber can download the paper.
- Subscriber can be directed to the paper view page when the user clicks on the link of the paper in the search result page.
- Subscriber can search the paper by searching the author name, by searching title of paper, by searching like amount, by searchingcitation amount, by searching view.

4. User Interface Design and Coresponding SQL Statements

4.1 Sign In Page

In order to utilize from the library, users have to have library account. The ones who have already an account can enter their username and password to access the library data. Others can get membership by pressing the sign-up button.

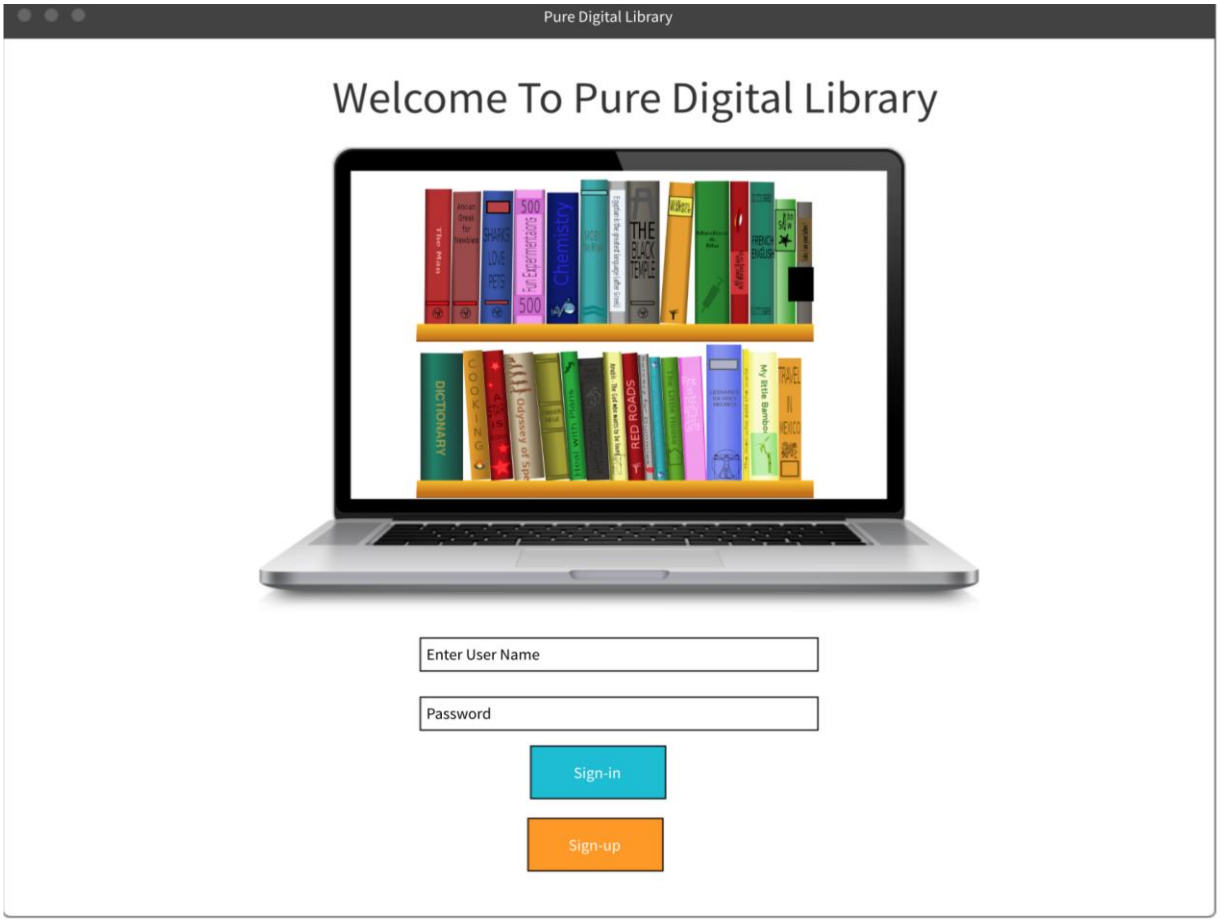
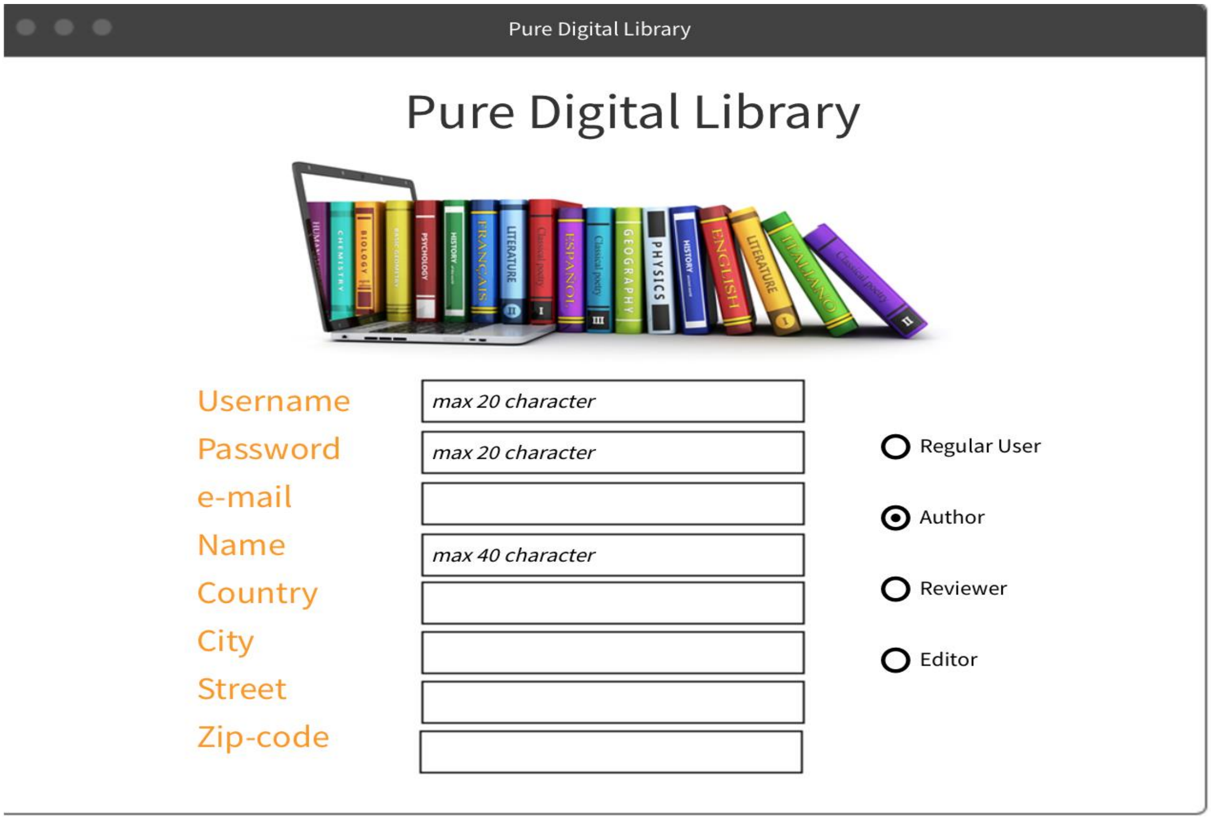


Figure 3 Sign In Page

4.2 Sign up page

In this page, users create their library account by entering required information that are displayed below on figure.



Pure Digital Library

Pure Digital Library

Username	max 20 character
Password	max 20 character
e-mail	
Name	max 40 character
Country	
City	
Street	
Zip-code	

○ Regular User

● Author

○ Reviewer

○ Editor

Figure 4 Sign Up Page

e.g: username: “Kaan_Fredrick_87”, password: “fedo123”, privilegedID: 1 (Author), email: “kaan.fredrick@bilkent.edu.tr”, name = “Kaan Fredrick”, country: “Netherlands”, city: “amsterdam”, street: “Greenway Street”, zip-code: 02341.

When adding a new subscriber:
insert into subscriber
values (“Kaan_Fredrick_87”, “fedo123”, 1, “kaan.fredrick@bilkent.edu.tr”, “Kaan Fredrick”, “amsterdam”, “Greenway Street”, 02341);

4.3 Search Page

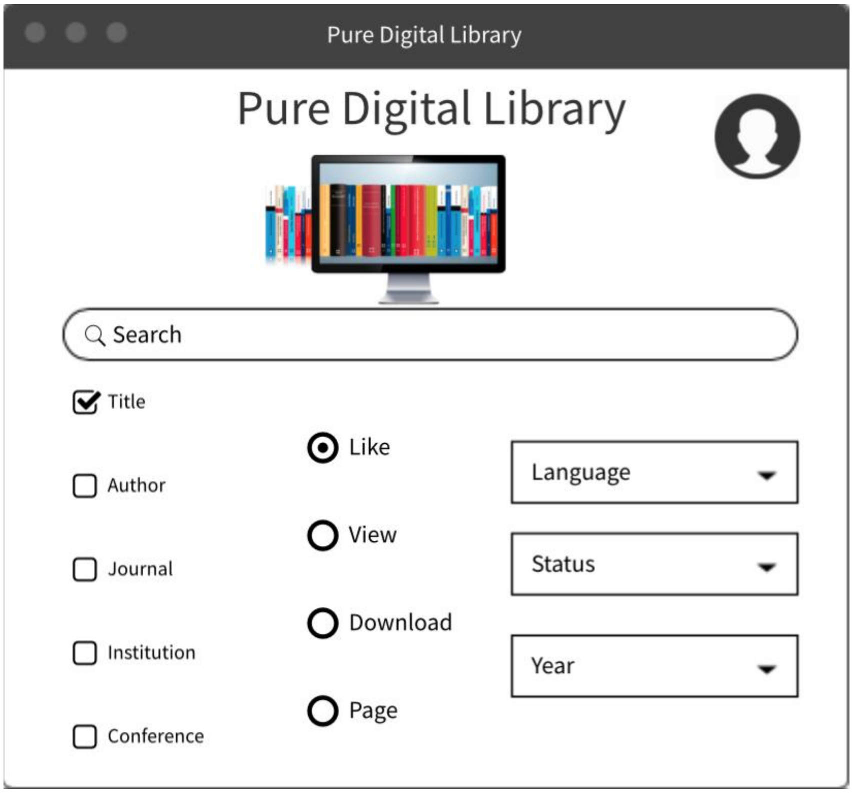
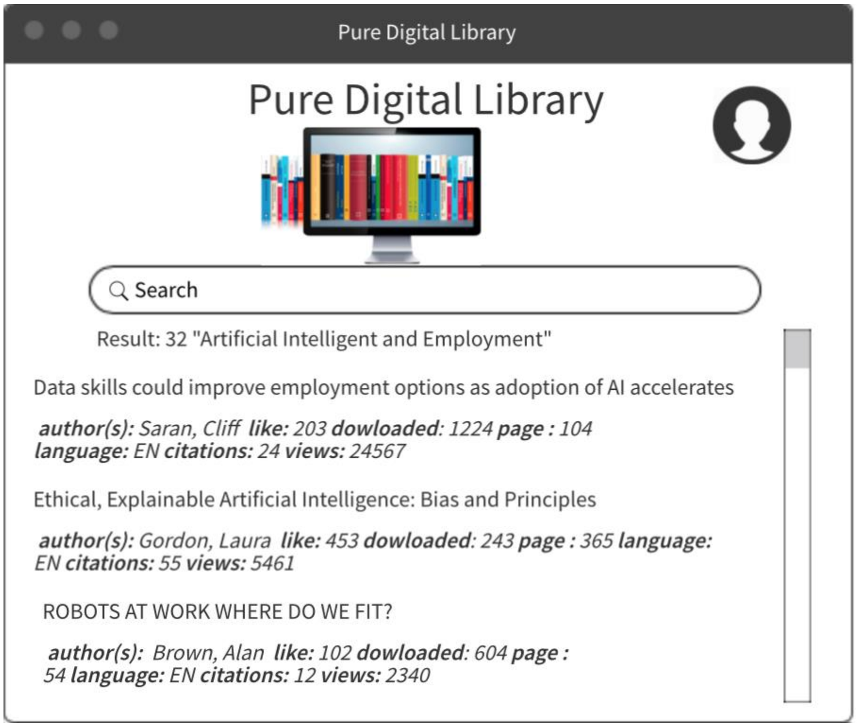


Figure 5 Search by title Page



Result: 32 "Artificial Intelligent and Employment"

Data skills could improve employment options as adoption of AI accelerates

author(s): *Saran, Cliff* ***like:*** *203* ***dowloaded****: 1224* ***page :*** *104*
language: *EN* ***citations:*** *24* ***views:*** *24567*

Ethical, Explainable Artificial Intelligence: Bias and Principles

author(s): *Gordon, Laura* ***like:*** *453* ***dowloaded****: 243* ***page :*** *365* ***language:***
EN ***citations:*** *55* ***views:*** *5461*

ROBOTS AT WORK WHERE DO WE FIT?

author(s): *Brown, Alan* ***like:*** *102* ***dowloaded****: 604* ***page :***
54 ***language:*** *EN* ***citations:*** *12* ***views:*** *2340*

Figure 6 Results Page

Search by paper title

Since when searching a paper, according to our user interface design, the information of like number, download number and view number associated with the paper that is searched will be listed. So we must find the like, download and view numbers of the papers. The user could also select filters when searching for papers. The filters would be set to default values and the user will be able to change the filters.

Note: The isLiked, isDownloaded and isViewed are 0 or 1.

```
input: $title
        $filter.language
        $filter.status
        $filter.year
```

To get the like, download and view number information of the listed papers according to the filters and the selected order:

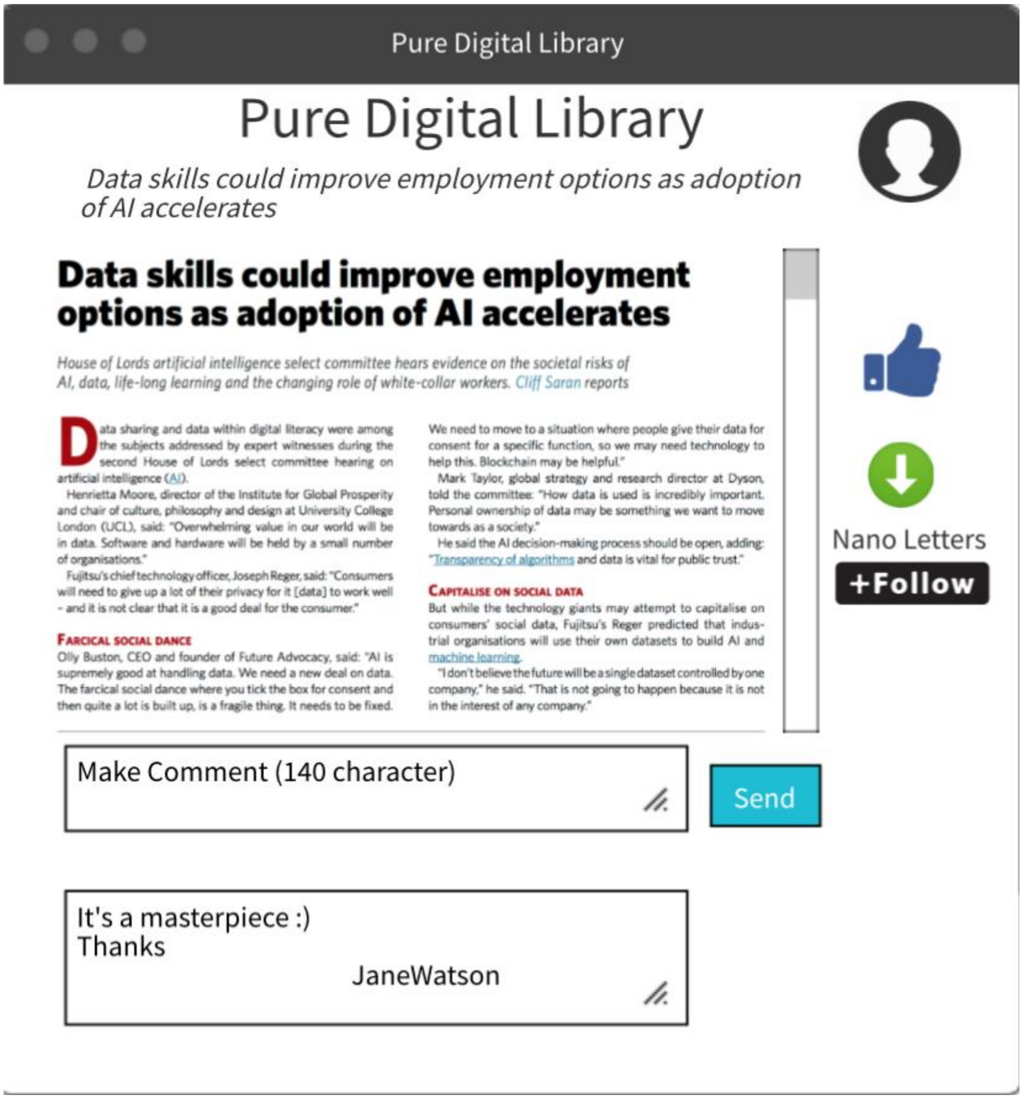
```
with paper_info(paperID, like_no, download_no, view_no) as
        select SR.paperID, sum(SR.isLiked) as like_number, sum(SR. isDownloaded) as
        download_number, sum(SR. isViewed) as view_number
        from scientific_research_paper SR natural join
        subscriber_likes_downloads_views_paper S
        where SR.title like %$title% and SR.language = $filter.language and SR.status =
        $filter.status and SR.release_date = $filter.year
        group by SR.paperID )

select S.title, S.release_date, P.like_no, P.download_no, P.view_no
from scientific_research_paper S natural join paper_info P
order by like_no desc;
```

To get the information of the citation numbers of the listed papers:

```
with paper_citation_no(paperID, citation_number) as
        select SR.paperID, count(distinct PC. paper_to_be_cited) as citation_number
        from scientific_research_paper SR, paper_citation PC
        where SR.title like %$title% and SR.paperID = PC. paper_that_cites and
        SR.language = $filter.language and SR.status = $filter.status and
        SR.release_date = $filter.year
        group by SR.paperID )
select S.title, S.release_date, P.citation_number
from scientific_research_paper S natural join paper_citation_no P;
```

4.4 View Page



Data skills could improve employment options as adoption of AI accelerates

Data skills could improve employment options as adoption of AI accelerates

House of Lords artificial intelligence select committee hears evidence on the societal risks of AI, data, life-long learning and the changing role of white-collar workers. Cliff Saran reports

Data sharing and data within digital literacy were among the subjects addressed by expert witnesses during the second House of Lords select committee hearing on artificial intelligence (AI).

Henrietta Moore, director of the Institute for Global Prosperity and chair of culture, philosophy and design at University College London (UCL), said: "Overwhelming value in our world will be in data. Software and hardware will be held by a small number of organisations."

Fujitsu's chief technology officer, Joseph Reger, said: "Consumers will need to give up a lot of their privacy for it [data] to work well - and it is not clear that it is a good deal for the consumer."

Farcical social dance

Olly Buston, CEO and founder of Future Advocacy, said: "AI is supremely good at handling data. We need a new deal on data. The farcical social dance where you tick the box for consent and then quite a lot is built up, is a fragile thing. It needs to be fixed. We need to move to a situation where people give their data for consent for a specific function, so we may need technology to help this. Blockchain may be helpful."

Mark Taylor, global strategy and research director at Dyson, told the committee: "How data is used is incredibly important. Personal ownership of data may be something we want to move towards as a society."

He said the AI decision-making process should be open, adding: "Transparency of algorithms and data is vital for public trust."

Capitalise on social data

But while the technology giants may attempt to capitalise on consumers' social data, Fujitsu's Reger predicted that industrial organisations will use their own datasets to build AI and machine learning.

"I don't believe the future will be a single dataset controlled by one company," he said. "That is not going to happen because it is not in the interest of any company."

Make Comment (140 character)

It's a masterpiece :)
Thanks
JaneWatson

Figure 7 View Paper Page

When the user clicks on the link of the paper in the search result page, the user will be directed to the paper view page. After the user has clicked the paper's link in the result page, the isViewed attribute will be updated to 1 for that specific user and paper in the subscriber_likes_downloads_views_paper table. Also the isDownloaded and isLiked attributes will be updated to 1 if the user clicks the buttons accordingly. The user will also be able to follow the journal the paper has been published in if the paper has been published in a journal.

The isViewed attribute will be updated to 1 for the tuple containing the information of that specific user and paperID:

```
update subscriber_likes_downloads_views_paper
        set isViewed = 1
        where username = $username and paperID = $paperID
```

If the user presses the like button, the isLiked attribute will be updated to 1 for the tuple containing the information of that specific user and paperID:

```
update subscriber_likes_downloads_views_paper
        set isLiked = 1
        where username = $username and paperID = $paperID
```

If the user downloads the paper, the isDownlaoded attribute will be updated to 1 for the tuple containing the information of that specific user and paperID:

```
update subscriber_likes_downloads_views_paper
        set isDownloaded= 1
        where username = $username and paperID = $paperID
```

when the user follows a journal, a new tuple will be inserted into the table subscriber_follows_journal:

```
insert into subscriber_follows_journal
values($username, $journal_name)
```

when the user comments under a paper a tuple will be added to the subscriber_comment_paper table:

```
insert into subscriber_comment_paper
values($date, $text, $username, $paperID)
```

4.5 Profile Page

The profile page is not related to sql code directly. When the user clicks one of the buttons, the button will direct the user to a new page. A user can delete his or her account. There are different types of users, thus the sql tables related to each user type is different and when deleting these users, they must be deleted from the tables they are being used in.

Common for all users:

```
delete from subscriber
where username = $username

delete from subscriber_likes_downloads_views_paper
where username = $username

delete from subscriber_follows_journal
where username = $username

delete from subscriber_comment_paper
where username = $username
```

Deletions specific for authors:

```
delete from author_institution
where username = $username

delete from author_has_paper
where username = $username
```

Deletions specific for editors:

```
delete from conference_editor
where username = $username

delete from paper_evaluation
where editor_username = $username
```

Deletions specific for reviewers:

```
delete from conference_reviewer
where username = $username
```

```
delete from paper_evaluation
where reviewer_username = $username
```

4.5.1 Author Pages

If the user has Author privileges, in the profile page, there will be two additional buttons which will direct the users to the following pages:

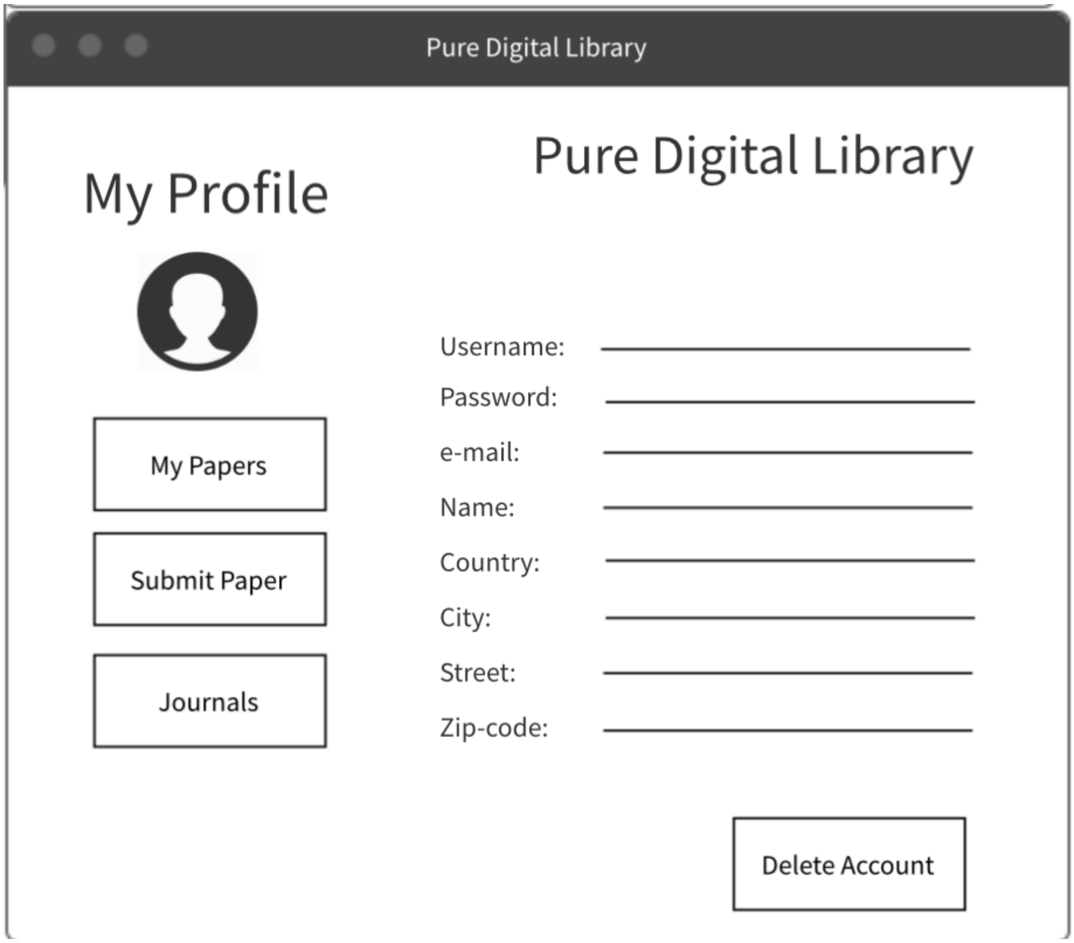
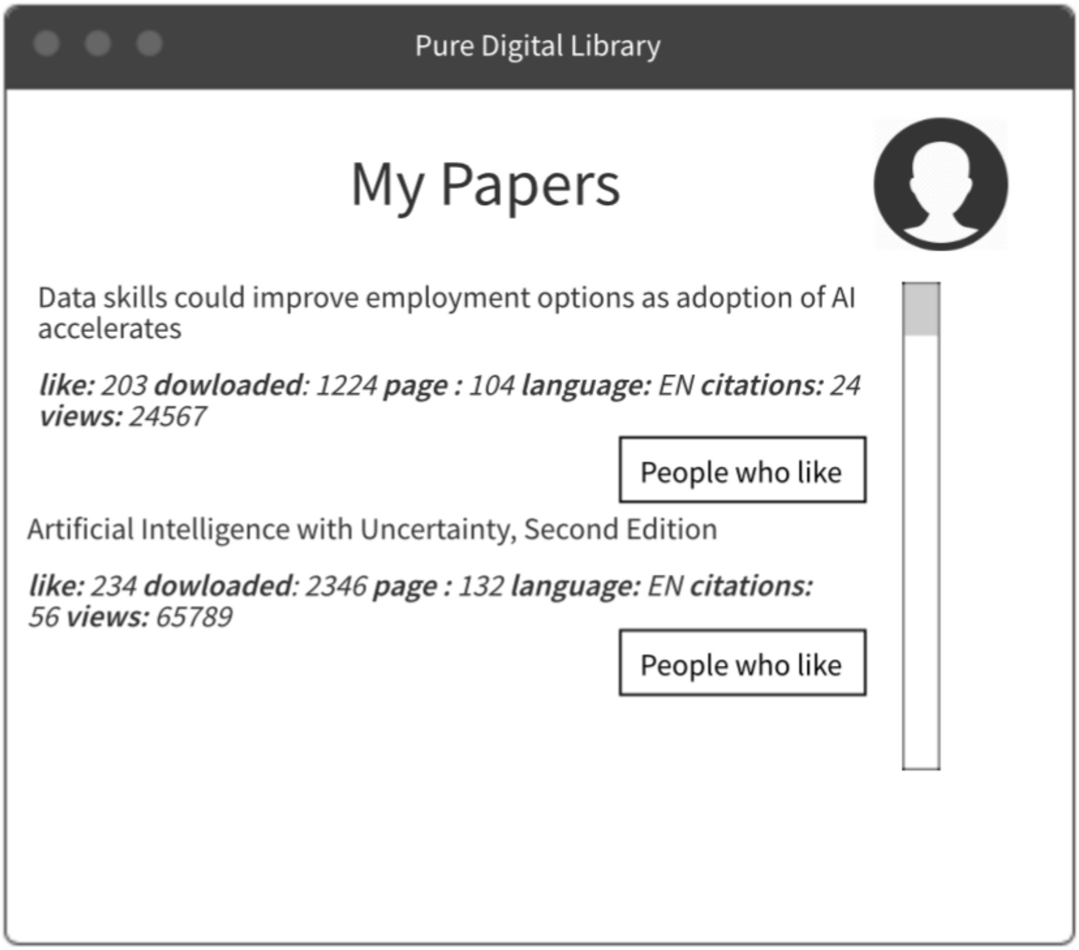


Figure 8 Author Profile Page

4.5.1.1 My Papers Page

The Author will be able to see the papers s/he has written and the like, download and view numbers of each paper separately. Additionally the author will be able to see the usernames of the people who liked her paper.



Data skills could improve employment options as adoption of AI accelerates

like: *203* ***dowloaded****: 1224* ***page :*** *104* ***language:*** *EN* ***citations:*** *24* ***views:*** *24567*

Artificial Intelligence with Uncertainty, Second Edition

like: *234* ***dowloaded****: 2346* ***page :*** *132* ***language:*** *EN* ***citations:*** *56* ***views:*** *65789*

Figure 9 My Papers Page

```
with paper_info(paperID, like_no, download_no, view_no) as
        (select A.paperID, sum(SR.isLiked) as like_number, sum(SR.
        isDownloaded) as download_number, sum(SR. isViewed) as
        view_number
        from author_has_paper A natural join scientific_research_paper SR
        natural join subscriber_likes_downloads_views_paper S using (paperID)
        where A.username = $username
        group by A.paperID)
select S.title, P.like_no, P.download_no, P.view_no, S.status
from scientific_research_paper S natural join paper_info P
```

see who liked which paper:

```
select username
from subscriber_likes_downloads_views_paper
where paperID = $paperID and isLiked = 1
```

4.5.1.2. Submit Paper Page

After the user clicks the submit paper button, s/he will be able to submit a paper to a conference. The author will enter the related information about the paper. Three tables will be modified after the user submits the information. There will be a function called generatePaperID which will generate new paper id’s for every new submitted paper. The status will be initially 0.

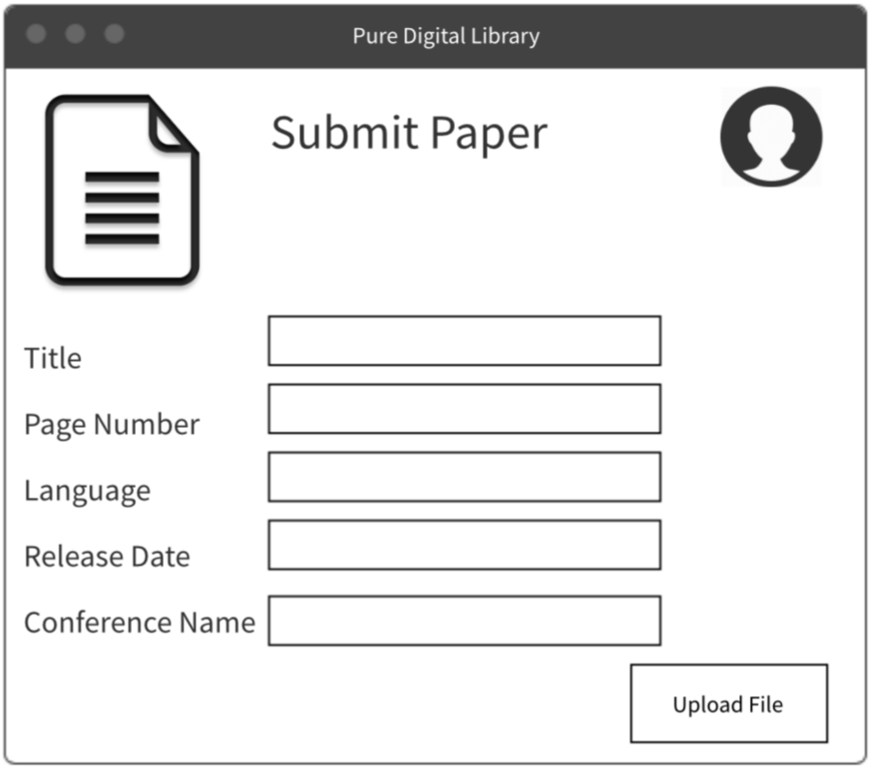


Figure 10 Submit Paper Page

Input: $title, $username, $conference_name, $page_number, $language, $release_date

```
insert into scientific_research_paper
values ($generatedPaperID, $title, 0, $page_number, $language, $release_date)

insert into paper_submit_conference
values ($conference_name, $generatedPaperID, $date)

insert into author_has_paper
values ($username, $generatedPaperID)
```

Author can add citation to her paper (The searching and selection of the papers are similar to the process we’ve described in the Search page so we are not writing it here again):

```
insert into paper_citation
values($generatedPaperID, $selectedPaperID)
```

4.5.2 Editor Pages

If the user has editor privileges, in the profile page, there will be an additional button which will direct the editor to the following page:

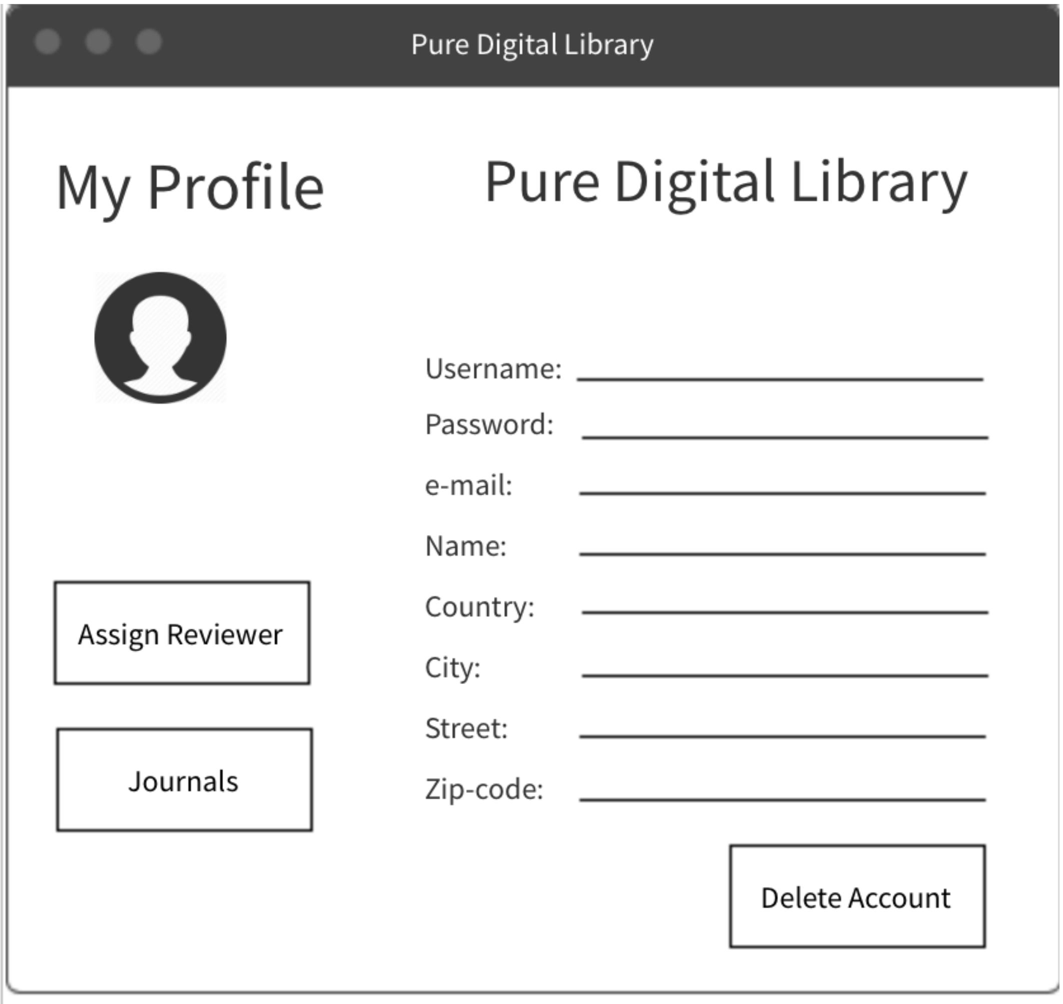
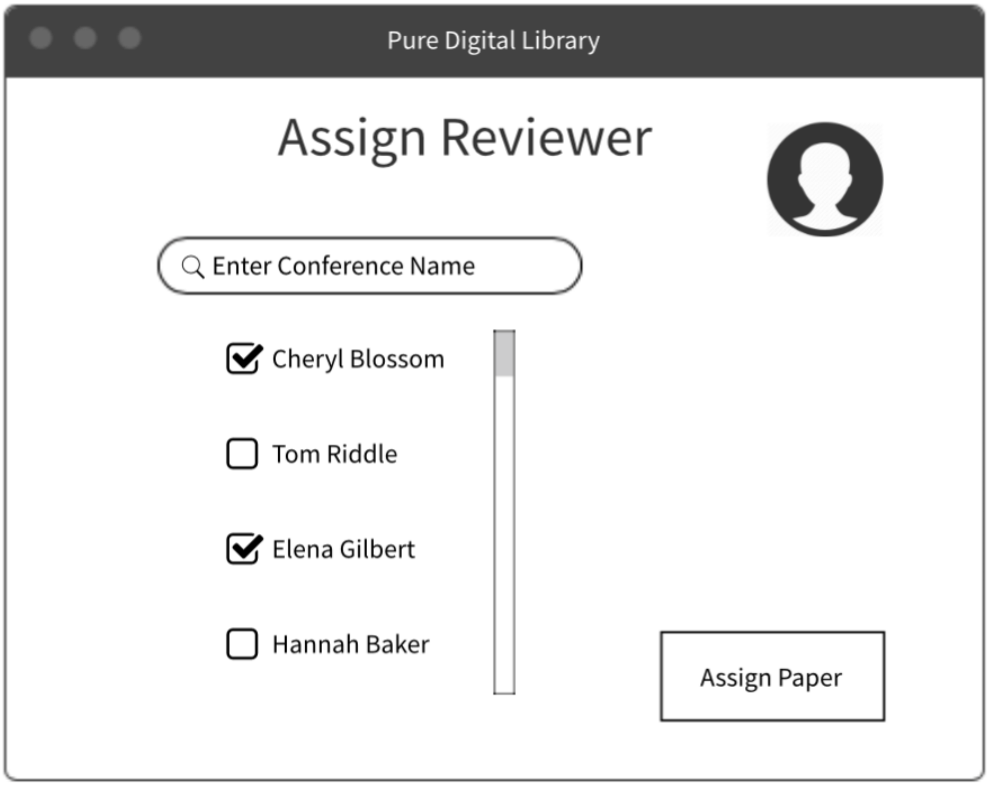


Figure 11 Editor Profile Page

4.5.2.1 Select Reviewer Page

In this page, the editor will be able to assign papers to reviewers. First the editor will be able to see the list of the reviewers according to the conference name selected and then will select a reviewer to assign papers to review. So the information of the list of reviewers are needed and after assigning a reviewer to a paper, a tuple must be added to the paper_evaluation table.



☑ Cheryl Blossom

☐ Tom Riddle

☑ Elena Gilbert

☐ Hannah Baker

Figure 12 Assign Reviewer Page

List reviewer names :

```
select username
from conference_reviewer
where conference_name = $conference_name
```

Insert reviewer to paper_evaluation table:

```
insert into paper_evaluation
values($reviewer_username, $editor_username, $paperID)
```

4.5.3 Reviewer Pages

If the user has reviewer privileges, in the profile page, there will be an additional button which will direct the reviewer to the following page:

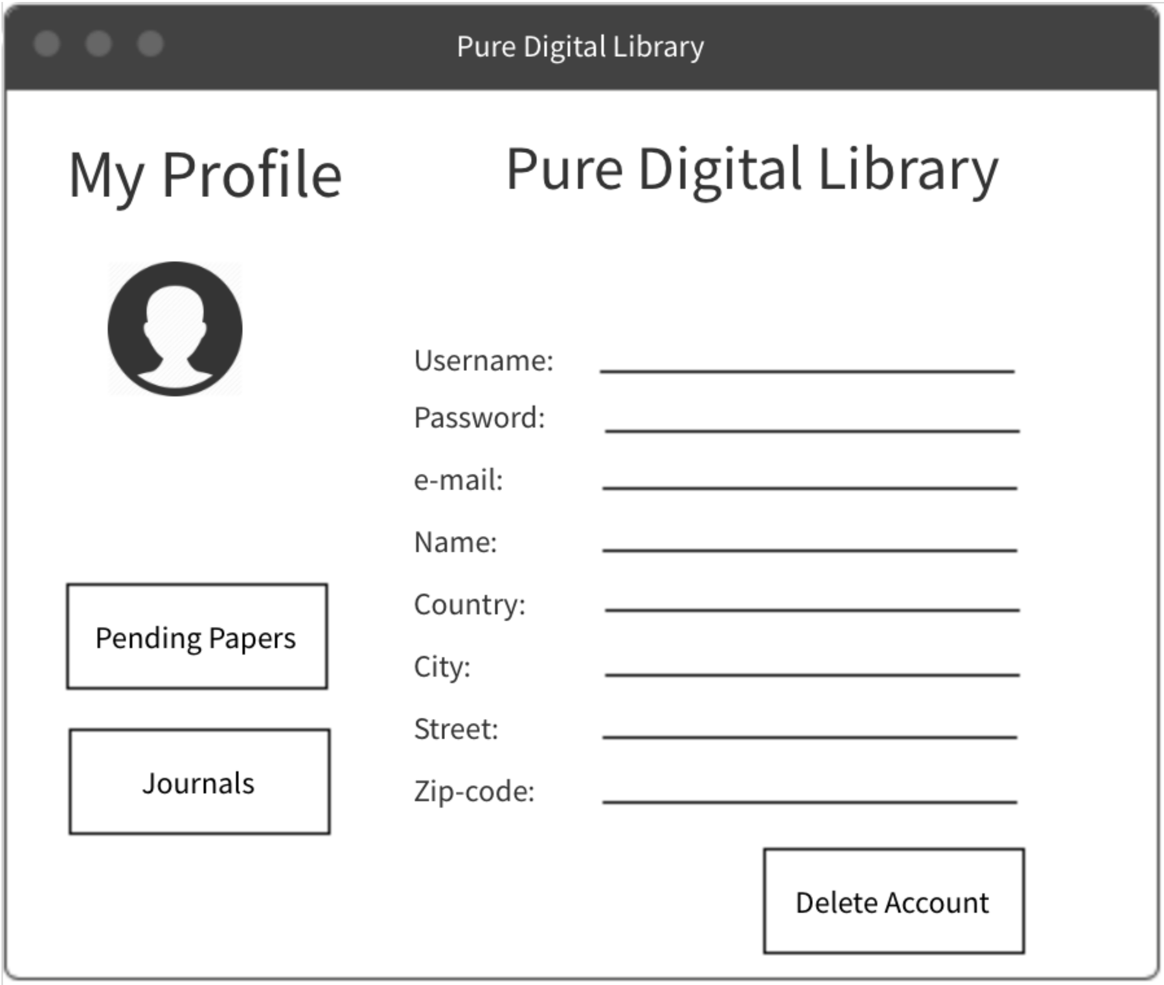
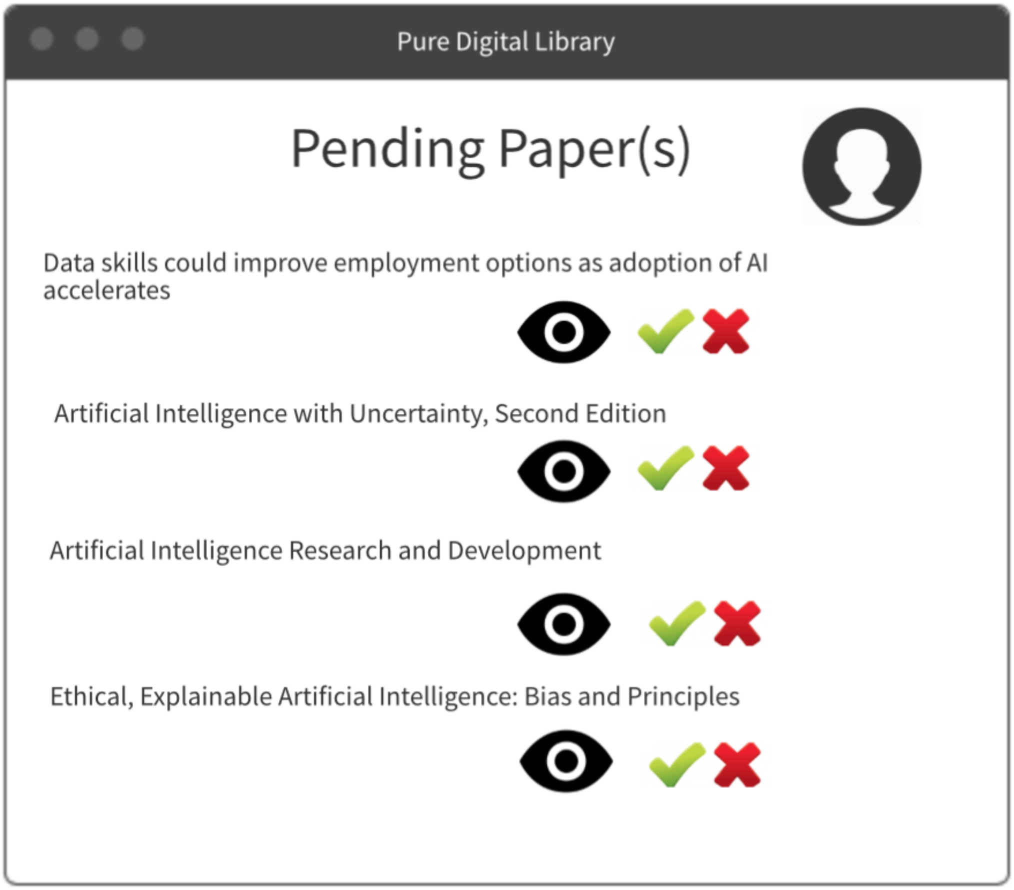


Figure 13 Reviewer Profile Page

4.5.3.1 Pending Papers Page

In this page the reviewer will be able to see the papers assigned to herself and make a decision about the acceptance of the paper.



Pure Digital Library

Pending Paper(s)

Data skills could improve employment options as adoption of AI accelerates

👁 ✓ ✗

Artificial Intelligence with Uncertainty, Second Edition

👁 ✓ ✗

Artificial Intelligence Research and Development

👁 ✓ ✗

Ethical, Explainable Artificial Intelligence: Bias and Principles

👁 ✓ ✗

Figure 14 Pending Papers Page for Reviewer

To list the papers assigned to the reviewer we will use this sql query:

select S.title
from scientific_research_paper S **natural join** paper_evaluation E
where E.reviewer_username = $username

Inserting the reviewer's decision to the paper_acceptance table (The decision is 0 for rejection or 1 for acceptance):

insert into paper_acceptance
values($username, $paperID, $decision)

After the decision has been made, the paper will be deleted from the pending papers list:

```
delete from paper_evaluation
where reviewer = $username and paperID = $paperID
```

4.5.4 Regular User Pages

This profile has no additional operations, therefore it is for the regular users which are neither author, editor nor reviewer. There is a single button where the user could see the journals s/he subscribed. This operation is also available for the other user types.

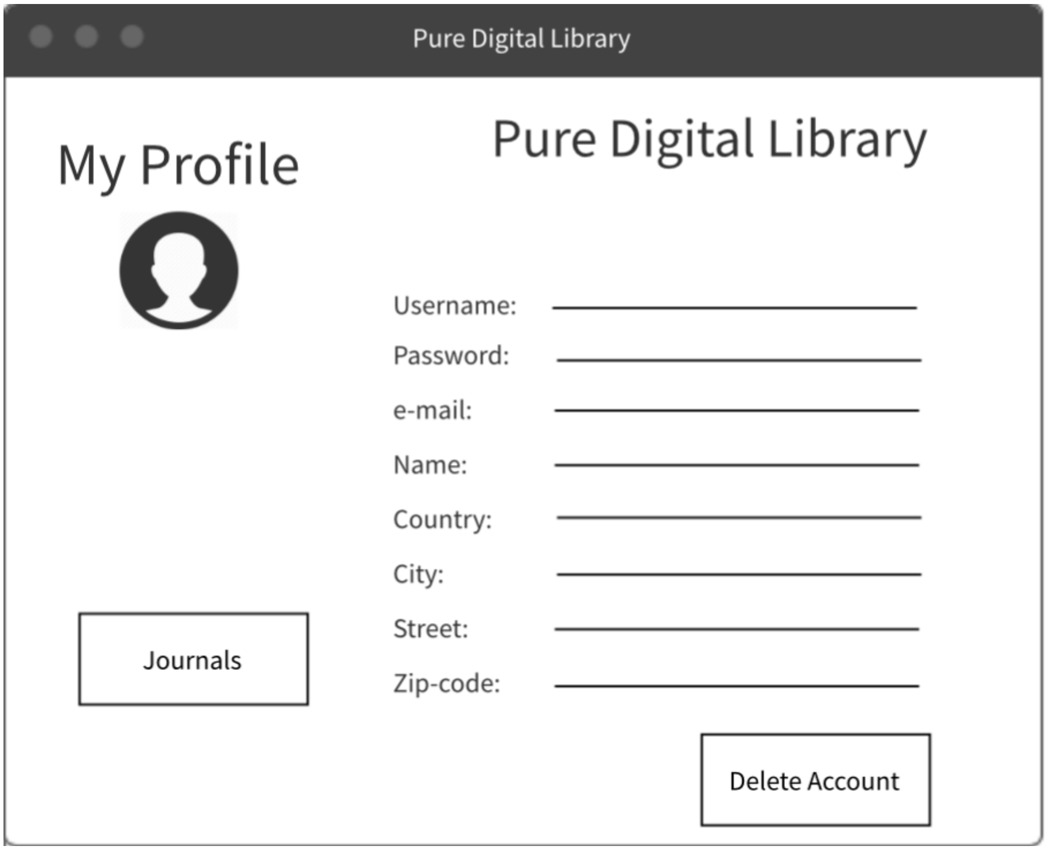
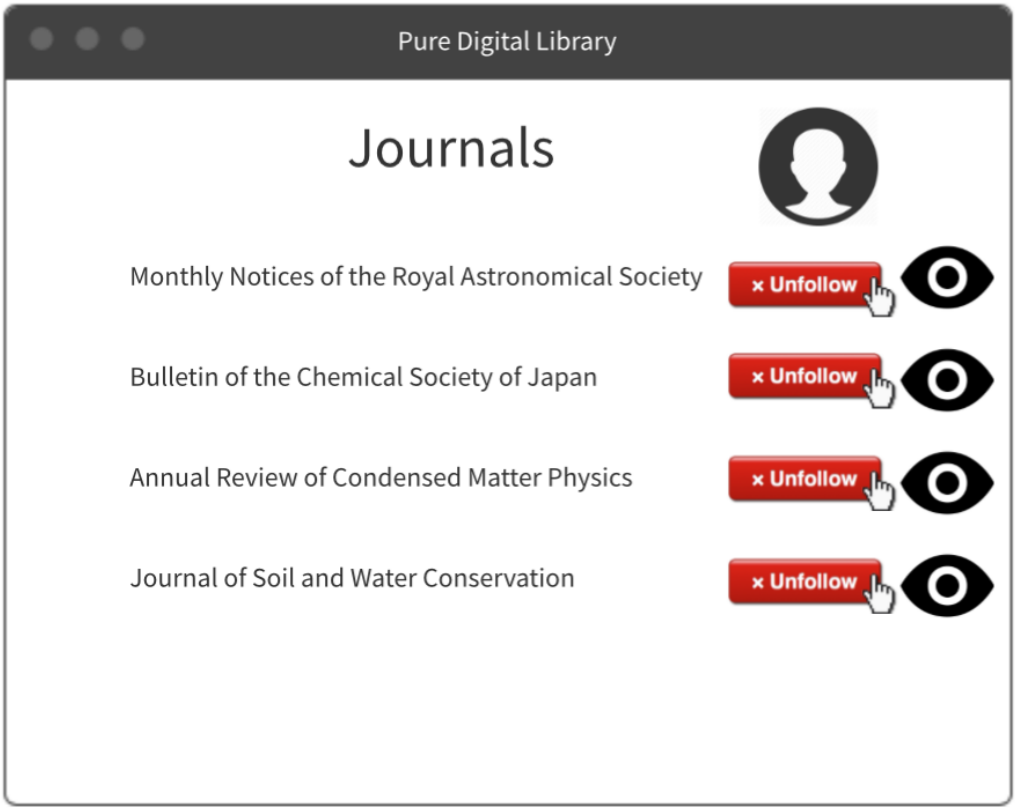


Figure 15 Regular user profile page

4.5.4.1 Subscribed Journals Page

The user will be able to see the list of the journals s/he subscribed to.



Monthly Notices of the Royal Astronomical Society

Bulletin of the Chemical Society of Japan

Annual Review of Condensed Matter Physics

Journal of Soil and Water Conservation

Figure 16 Followed Journals Page

To list all of the journals the user is following we will use this sql query:

```
select jounal_name
from subscriber_follows_journal
where username = $username
```

If the user selects the unfollow button then the tuple holding the information of the subscriber following that journal will be deleted from the table subscriber_follows_journal:

```
delete from subscriber_follows_journal
        where username = $username
```

5. Advanced Database Components

5.1 Constraints

- Every user has a unique username.
- User can like an article only once.
- Every author must be associated with an institution.
- Read count of an article will only increment when the user views that article for the first time.
- A comment can only be 140 characters.
- User can only add a single comment for an article, in order not to spam the comment section.
- Services of the system cannot be utilized without logging into the system
- The privileged ID of subscribers will determine their roles accordingly, which are author, reviewer, editor or regular user.
- Deadline of the conference must be earlier than the date of conference.
- The paper can only be published in a single conference or journal.

5.2 Triggers

- When an author submits a paper to a conference, a new tuple will be inserted to the author_has_paper, paper_submit_conference and scientific_research_paper tables. Also during submission the papers selected by the author as cited papers will be added to the table paper_citation.
- The number of yes and no decisions will be calculated from the paper_acceptance table and if the yes number is bigger than the no number the paper's status will be changed to published and this information will be added to the paper_publish_conference.

- When a user subscribes to a journal, the user's information will be added to the subscriber_follows_journal.
- When a comment is made, the information of the comment is added to the subscriber_comment_paper
- If the user likes/downloads/views a paper, then the related tuple will be updated, accordingly.
- When an editor assigns a paper to a reviewer, the information will be added as a new tuple into the paper_evaluation table. Also, when the reviewer makes a decision about a paper then that decision will be added to the paper_acceptance.
- When the reviewer finalizes his/her decision the tuple containing the information about the assignment will be removed from paper_evaluation table.

5.3 View

- An editor can only see the list of the reviewers of the conference he/she affiliated to. This view will be used in the Select Reviewer Page which is a specific page for editors only. The goal of this view is to be able to list the reviewer names for the editor. After viewing the list, the editor could select which reviewers to assign for a paper. This view is necessary because it would be irrelevant for an editor to be able to see editors from conferences the editor does not belong to.

```
create view editor_list_reviewer as
    select username
    from conference_reviewer
     where conference_name in (select conference_name
                                           from conference_editor)
```

- An Author can see the usernames of the people who liked his/her papers and other user types cannot see which user liked which paper. Also other authors cannot see the usernames of the users who have liked other authors' papers. So being able to see the usernames who have liked a paper is a privilege given to the author of that specific paper. This view is used in the “My Papers Page”.

When the author clicks the “people who like” button s/he will be able to see the usernames who have liked the paper.

```
create view people_who_liked as
select username
from subscriber_likes_downloads_views_paper
where isLiked = 1 and paperID in (select paperID
                                   from author_has_paper)
```

5.4 Report

- The first, second and third highest downloaded papers’ Id’s:

Download number of each paper:

```
with temp(paperID, download_count) as
(select paperID, count(*)
from subscriber_likes_downloads_views_paper
group by paperID)
```

Highest downloaded paper:

```
select paperID
from temp
where donwload_count = (select  max(download_count)
                        from temp)
```

Second highest downloaded paper:

```
select paperId
from temp T1
where (select count(*)
        from temp T2
        where T2.download_count > T1.download_count) = 1
```

Third highest downloaded paper:

```
select paperId
from temp T1
where (select count(*)
    from temp T2
    where T2.download_count > T1.download_count) = 2
```

- The accepted paper count of each author:

Note: There are four status for the papers in out database.

0 → submitted

1 → on review (pending paper)

2 → accepted

3 → rejected

```
select username, count(*) as accepted_paper_count
from author_has_paper A natural join scientific_research_paper S
group by A.username
having S.status = 2
```

- The total number of papers in each state:

```
select count(*) as status_count
from scientific_research_paper
group by status
```