

COEN6311 Deliverable 2: System Modeling and Design

GroupSuper

Ding Li 40160073
Zerui Wang 40177315
Jun Huang 40168167

October 22, 2021

1 Introduction

This delivery includes a description of our process of following the Agile development process, defining the RoadMap using the Jira management tool, performing requirements segmentation and relating user stories. Also define 3 Sprints for development. It also includes a documentation section, defining the use case, system architecture, modelling and designing (Class Diagram, Activity Diagram, Sequence Diagram, Statement Diagram). Also included is our Web UI design section. At the end of the article, after revisiting the UI design, we selected a new task as required and repeated the requirement section, having planned new milestones.

2 Agile development process

Team Setup: As a three members team, we define the roles of [Product Owner] *Jun Huang* and [Scrum Master] will be a shift between *Zerui Wang* and *Din Li*. We use JIRA as our management tool, the whole roadmap for the project is shown in Figure 1.

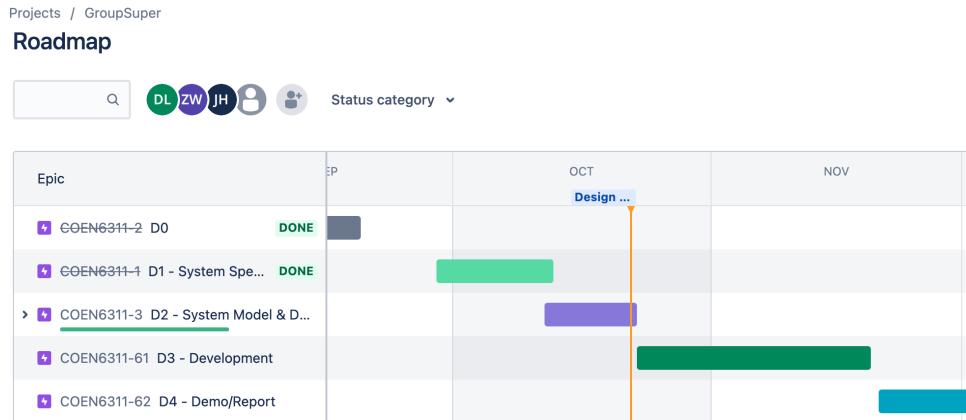


Figure 1: Roadmap - JIRA Management Tool

Associate user stories to sub-requirements: Previous deliverable we define three user stories and 7 sub-requirements. They are associated to each other by JIRA linked issues feature. Figure 2 gives an example that we connect User Story 2 Lucy to the ICDE Record Capture and Access module in sub-requirement 4 and Authorized API Module in sub-requirement 5. The full sub-requirement assignments are listed in our Jira panel:

<https://youyinnn.atlassian.net/jira/software/projects/COEN6311/boards/2/backlog>.

Projects / GroupSuper / Add epic / COEN6311-79

Lucy wants to see her paper browsing history, so she can retrieve her previous work.

Attach Add a child issue Link issue Track time with Clockwork Add Checklist

Description

Add a description...

Linked issues

relates to

<input checked="" type="checkbox"/> COEN6311-5 Scenario 2: Researcher - Lucy	<input type="button" value="DL"/>	<input type="button" value="TO DO"/>
<input checked="" type="checkbox"/> COEN6311-28 SRS 4.1 ICDE Record Capture Module	<input type="button" value="DL"/>	<input type="button" value="TO DO"/>
<input checked="" type="checkbox"/> COEN6311-49 SRS4.2 ICDE Record Access Module	<input type="button" value="DL"/>	<input type="button" value="TO DO"/>
<input checked="" type="checkbox"/> COEN6311-17 SRS 5.1 Non-user-authorized API	<input type="button" value="DL"/>	<input type="button" value="TO DO"/>
<input checked="" type="checkbox"/> COEN6311-57 SRS 5.2 User-authorized API	<input type="button" value="DL"/>	<input type="button" value="TO DO"/>

Figure 2: An example of associating user stories to sub-req

Define tasks and priority under each requirement: Tasks are deployed under each sub-requirement to be finished. We also separate different Dev Sprints to accomplish the whole project. Dev Sprint 1 includes Sub-requirements 1 & 2 that involve login, log out and information management system. Dev Sprint 2 includes sub-requirements 3 & 4 & 5 that contains ICDE process and the authorized API. Dev Sprint 3 includes sub-requirements 6 & 7 mainly for the team management service. Figure 3 gives an example that how we add tasks under the sub-requirements defined earlier. The UML diagrams modelling and designing tasks for the whole system are also considered as a Sprint.

▼ Dev Sprint - SRS1/2 Add dates (12 issues)

<input checked="" type="checkbox"/> COEN6311-71 Jack wants to register a user account, so he can log in to the system.
<input checked="" type="checkbox"/> COEN6311-72 Jack wants to log out from the system, so he would not leave my personal information on the system.
<input checked="" type="checkbox"/> COEN6311-7 SRS 1.1 User Infomation Module
<input checked="" type="checkbox"/> COEN6311-12 SRS 1.2 Login Module
<input checked="" type="checkbox"/> COEN6311-73 Jack wants to search papers with certain keywords, so he can browse the result for his assignment.
<input checked="" type="checkbox"/> COEN6311-11 SRS 3.1 Paper Search Module
<input checked="" type="checkbox"/> COEN6311-74 Jack wants to see the detail page of the paper that he clicks into, so he will know more about the paper.
<input checked="" type="checkbox"/> COEN6311-76 Jack wants to comment on the paper, so he can express his idea of it.
<input checked="" type="checkbox"/> COEN6311-75 Jack wants to download the paper, so he can read the pdf file of the paper.
<input checked="" type="checkbox"/> COEN6311-77 Jack wants to click the "dislike" button, so the other will know it.
<input checked="" type="checkbox"/> COEN6311-9 SRS 2.1 Paper Download Module
<input checked="" type="checkbox"/> COEN6311-23 SRS 2.2 Paper Operation Module

Figure 3: An example of defining tasks under each Sprint

3 Revising and Modelling.

This section includes the modelling and designing both overall level and user/system requirements level.

3.1 Revise the context/external description

Overall Use Cases: The overall use case is shown as Figure 4.

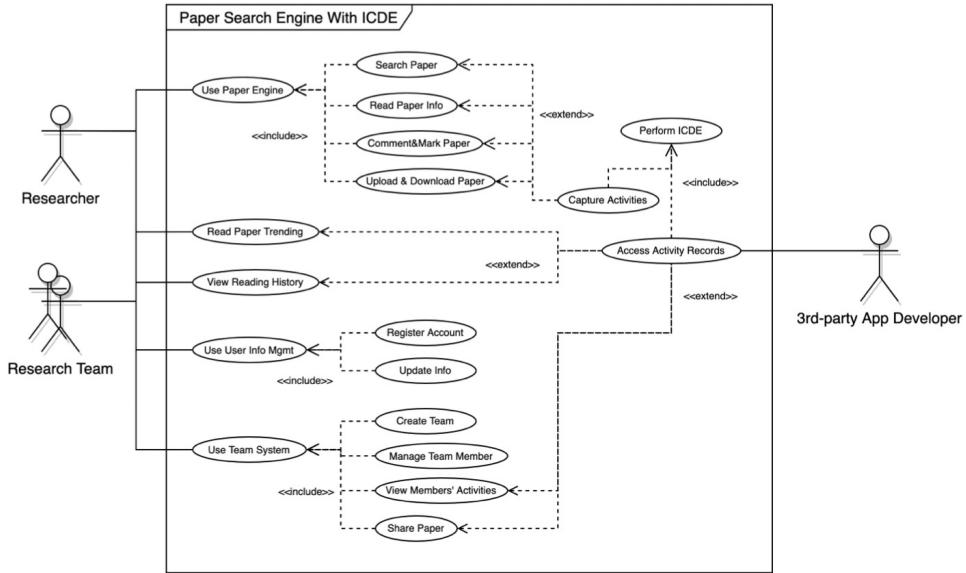


Figure 4: Overall Use Cases

Use case Diagrams: According to the various sub-requirements level, we specify the use cases as follows of user requirements and system requirements level, which are shown in different subgraphs of Fig. 5 and Fig. 6.

System Architecture

The **context diagram** of the system is shown in: Fig. 7, which indicates that the system has no dependences on outer systems.

The **system architecture diagram** is shown in: Fig. 8.

The system will follow the MVC architecture since the client end of the system will be web browser. And obviously, it follows the layer pattern.

Notice that component with red box is designed for future development of this system itself. It might not be implemented within the scope of the class project but it will still have interfaces defined.

3.2 System modeling and design.

Use UML to describe system context environment, objects, and key processes.

System Business Object

According to the latest system requirement specifications(SRS), the system will have the following business objects(BO) which serve the MVC.

Fig. 9 shows the very basic BOs of the system. **Record** will be the topmost general BO above any other BO. **Researcher** will represent the solid system user. **PaperMetadata** will represent paper informations. More fields of PaperMetadata can be refer to: <http://bib-it.sourceforge.net/help/fieldsAndEntryTypes.php>.

Fig. 10 shows the BOs which represent the users' preference about certain paper. **PaperComment** will be the comment wrote by the user. **PaperLikeAndDislike** will represent the preference from the user.

Fig. 11 shows the BOs which represent the users' paper collection. **PaperCollectionCat** will be the collections which are created by the user. **PaperCollectionRecord** will represent the single paper that collected within certain collection category.

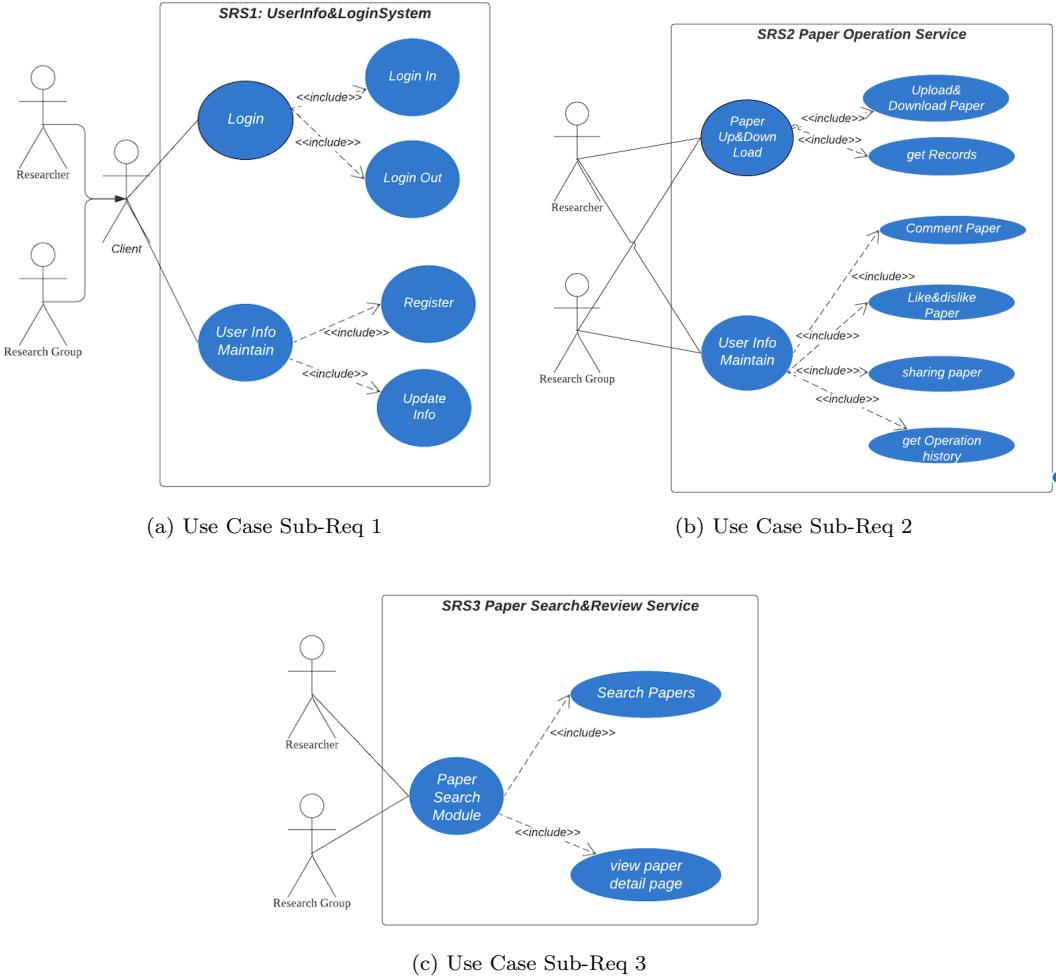


Figure 5: Use case Diagrams

Fig. 12 shows the BOs which will gain the benefits from the ICDE. **UserOperationRecord** will be the records that are created by the system whenever the system user performs paper-relevant actions. **PaperClickTrending** will represent the trending of how many clicks on certain papers, this data will generate by the system using the data recorded by ICDE. **SearchTermTrending** will represent the trending of the hottest search terms.

Fig. 13 shows the BOs which represent Team features of the system. **ResearchTeam** will represent a research team. **ResearchTeamAuthRecord** will represent the relationship between users and teams.

Fig. 14 shows the BOs which will serve the 3rd-party ICDE application. **ICDEThirdPartyApplication** will represent a registered 3rd-party ICDE application. **ICDEThirdPartyAppAuthRecord** will represent the relationship between ICDE applications and users.

Notice that those BOs are designed for future development of this system. It might not be implemented within the scope of the class project but it will still have classes or interfaces defined.

Representative Diagram for Key SRS

For SRS1.1.1-Register, it can be represent as activity diagram shown in Fig. 15.

For SRS1.1.2-Update User informations, it can be represent as activity diagram shown in Fig. 16.

For SRS1.2.1-Login, it can be represent as activity diagram shown in Fig. 17.

For SRS2.1.1-Download Paper, it can be represent as sequence diagram shown in Fig. 18.

For SRS 2.1.2, SRS 2.2.4, SRS 4.2, and SRS 5, they can be represent as activity diagram shown in Fig. 19.

For SRS 6.1.2-Team Invitation, it can be represent as activity diagram shown in Fig. 20. Also it

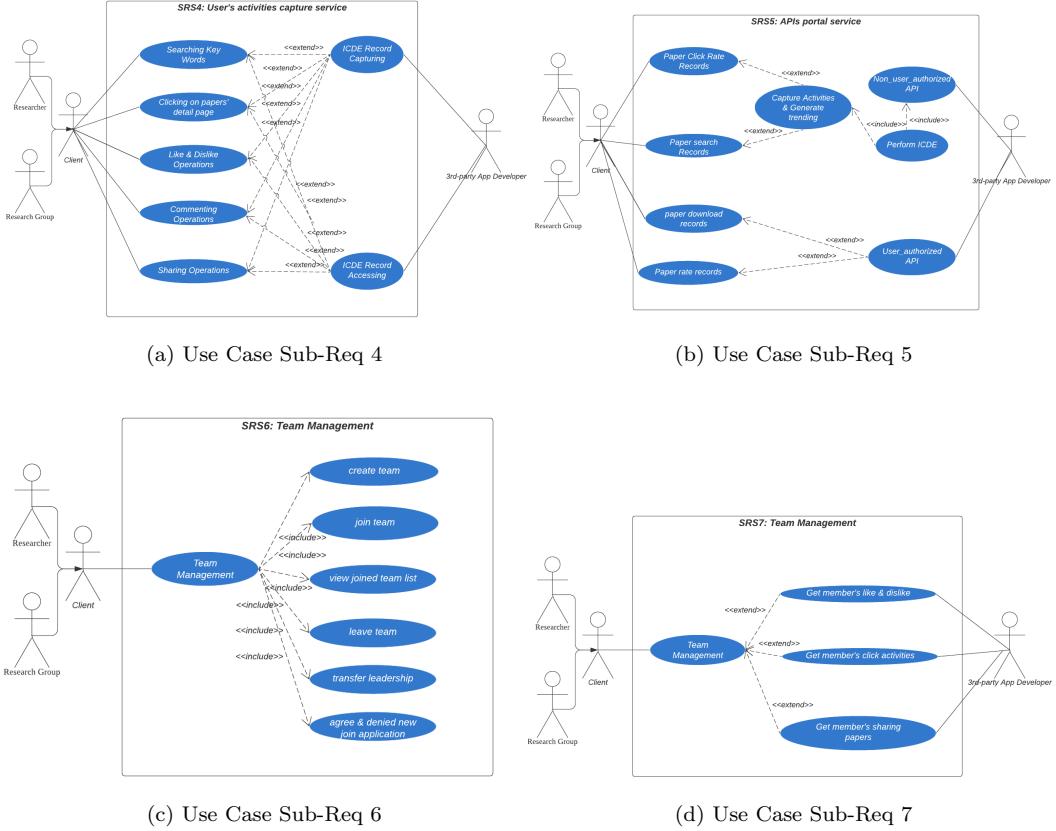


Figure 6: Use case Diagrams

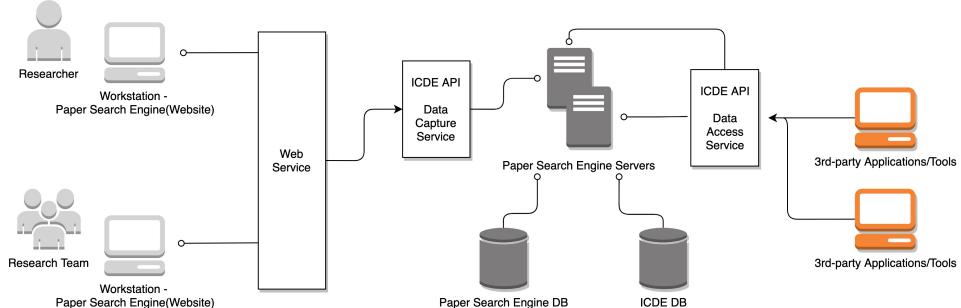


Figure 7: System Context

indicates how ICDE functions. And its sequence diagram is shown in Fig. 21. And also its state diagram shown in Fig. 22

4 Web UI Design

User interface (UI) design is targeted to let readers use the ScholarHub software conveniently. The UI should be simple and functional to attract the reader's attention and interests. The UI should avoid being overly complex so that it can be used without learning. The UI of ScholarHub consists of 7 parts. They are explained as follow:

Homepage: there is a logo in the middle to indicate the service function and enhance recognition. A motto at the bottom to inspire academic pursuits. To continue using the service, the user must log in by clicking the “login” button at the top right corner.

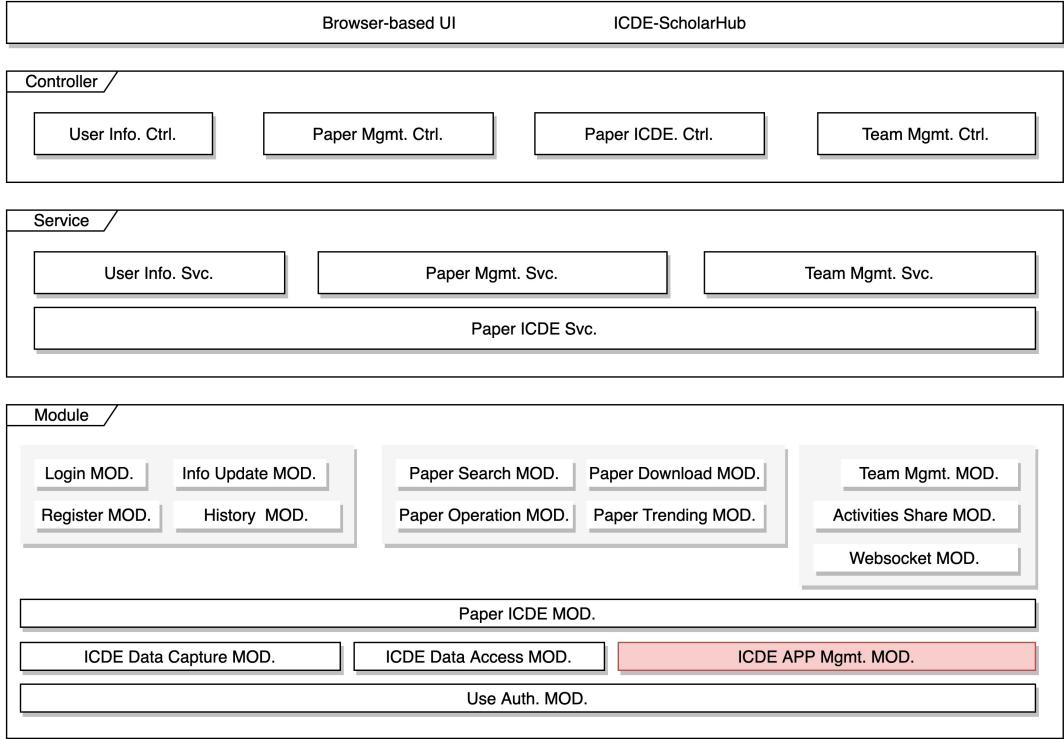


Figure 8: System Architecture

Record	PaperMetadata	Researcher
+ id: bigint unsigned key autoincrease. + create_time: datetime + update_time: datetime	+ address: varchar + annotate: varchar + author: varchar + book_title: varchar // more	+ username: varchar unique + password: varchar + name: varchar + gender: varchar + title: varchar + area: varchar + email: varchar

Figure 9: Business Objects Part1: Record, Researcher, PaperMetadata

Sign in: Email address and password are required to sign in. if the user does not have an account. It can jump to the registration page by simply clicking “I don’t have an account”. Only Email addresses and Passwords are requested for registration. Additionally, users can log in by connecting with Facebook, Google and Apple.

Menu page: As soon as the user logged in, the web will show the Menu page initially. On the top left is the logo of ScholarHub. Following with four card buttons on the top, which are Menu, Team, My Library and My Profile. These are four main functional pages. On the top middle, there is a search bar, users can search paper titles and team members’ names to directly check the information. On the top right-hand side, the button shows the user’s name to remind it has been login with the current account. The log-out function is inside the name button. The Menu page indicates three main zones. On the left is the team zone, it shows the list of the team that the user joined. In the middle, there is a brief reading list of history. That is for reminding the user to review the recent paper. On the right side is the recent activities zone, users can get go through other team members’ activities.

My Library: this is the main functional page for users to collect and organize their reading list. The

PaperComment + paper_id: same as Record.id + commenter_id: same as Record.id + comment: varchar	PaperLikeAndDislike + paper_id: same as Record.id + researcher_id: same as Record.id + like: bool
---	---

Figure 10: Business Objects Part2: PaperComment, PaperLikeAndDislike

PaperCollectionCat + name: varchar + researcher_id: same as Record.id	PaperCollectionRecord + collection_id: same as Record.id + paper_id: same as Record.id
--	---

Figure 11: Business Objects Part3: PaperCollectionCat, PaperCollectionRecord

list contains the information of Paper title, Authors, Author’s affiliation, Research field tag, Published year, Priority defined by the user, Read checkbox, Like checkbox, Link or DOI of the paper. Finally, the number of likes about the current paper in the system can be shown to the customer. Users can also open a text box and write a note by clicking the paper title. Users can click and check the read and like check-box to remind themselves. Also, the activity will be recorded and collected. This information will be available to the teammates and supervisor. The number of likes by all users will be counted and anonymously shown to others.

My Profile: This page allows users to edit and show their profile cards. It contains the following information: Roles in the group, Address, Email, Mobile number, Personal web address, Resume or other attached document file and tags for showing research interest. Personal headshot photos can be uploaded and shown on the top for others’ recognition.

Team: The team function is the core of the ICDE system and is to share literature information with others. On the left side, the joined team is listed. If the user wants to join another new team or create a team, it would be just a simple click on the plus sign. Then, the pop-up window will request a team ID and password. The funder of a team can edit passwords. The information of team members will be listed in the table. Including the information about Name, Role, Stage position and so on. It is automatically extracted from their individual profile. Therefore, users can easily get the teammate’s contact information. By clicking the “activity”, the recently recorded activities will show by timeline. Also, the paper that the teammates liked will be listed on the right side for user to read.

5 Repeat Req2 and Further evaluate the process and milestones

After attending Week 7 Lecture our team found that we shall adding the non-functional requirement for our system that constraints on the services offered by the system. We consider timing constraints that limit the whole service hours for users including research individual and research group. During 0:00 to 6:00 on every Sunday the system will unavailable for researchers(either the individual or the group).

The whole process and milestones are newly evaluate and listed the milestone in Jira as Figure 1. Currently we have finished Sprint1 and the sub-tasks are listed on Jira as Figure 30. The schedule for team is that 8 hours per member per week, and the budget is keeping stable.

UserOperationRecord	PaperClickTrending	SearchTermTrending
+ type: varchar + researcher_id: same as Record.id + paper_id: same as Record.id + input_text: varchar	+ trending_date: datetime + p_id_list: varchar	+ trending_date: datetime + term_list: varchar

Figure 12: Business Objects Part4: UserOperationRecord, PaperClickTrending, SearchTermTrending

ResearchTeam	ResearchTeamAuthRecord
+ team_name: varchar + area: varchar + leader_id: same as Record.id	+ researcher_id: same as Record.id + team_id: same as Record.id + state: varchar + expire_date: datetime + role_tag: varchar

Figure 13: Business Objects Part5: ResearchTeam, ResearchTeamAuthRecord

ICDEThirdPartyAppAuthRecord	ICDEThirdPartyApplication
+ researcher_id: same as Record.id + app_id: same as Record.id + auth_scope_json: varchar + expire_date: datetime	+ name: varchar + owner_email: varchar

Figure 14: Business Objects Part5: ICDEThirdPartyApplication, ICDEThirdPartyAppAuthRecord

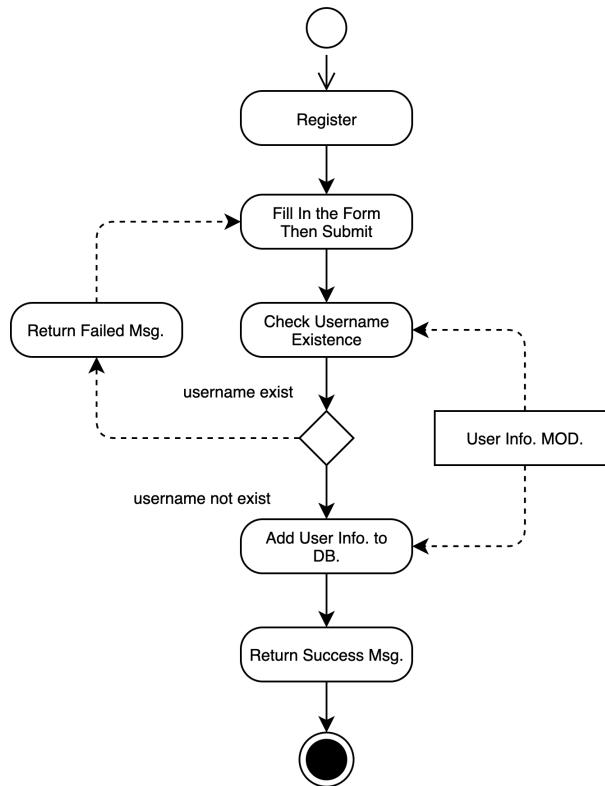


Figure 15: Activity Diagram for SRS1.1.1

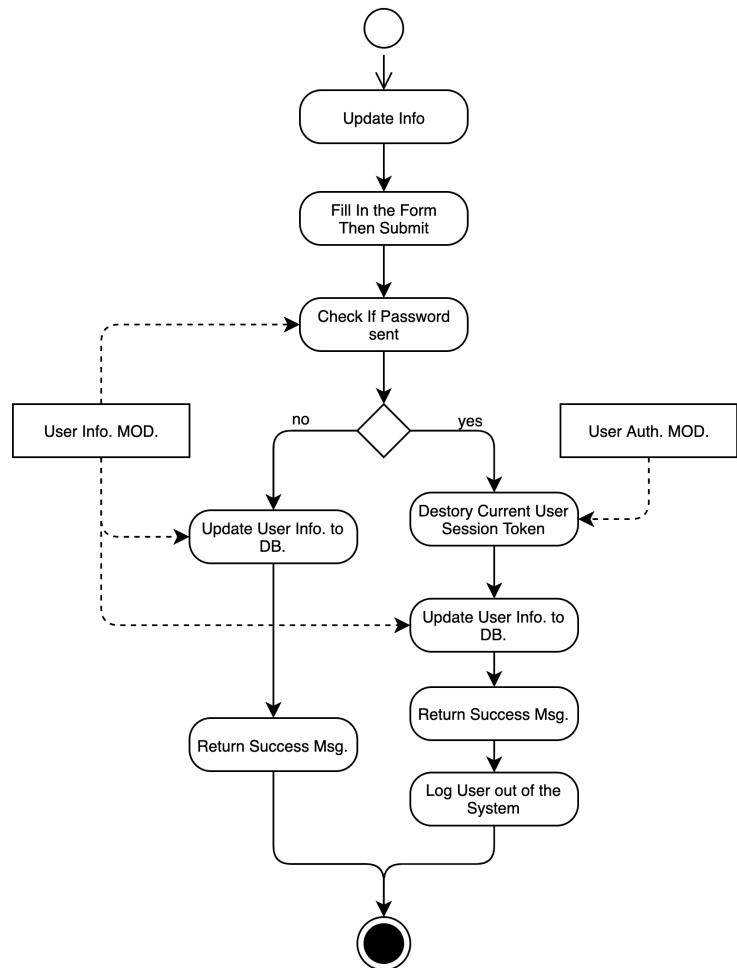


Figure 16: Activity Diagram for SRS1.1.2

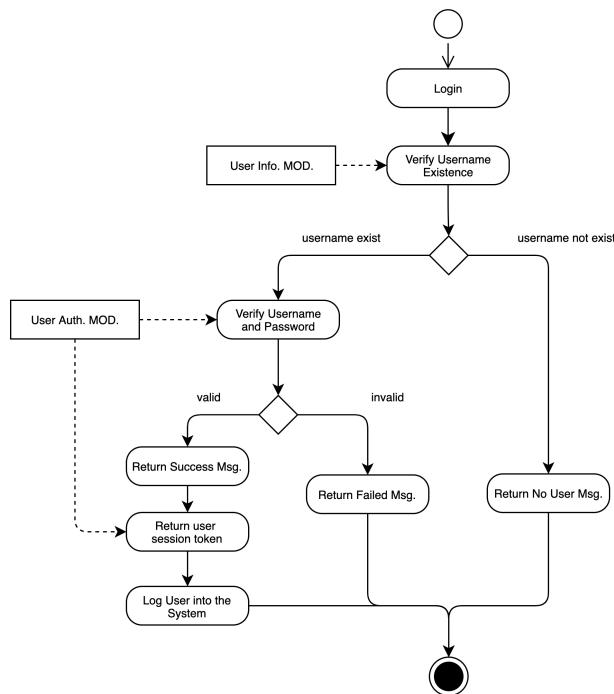


Figure 17: Activity Diagram for SRS1.2.1

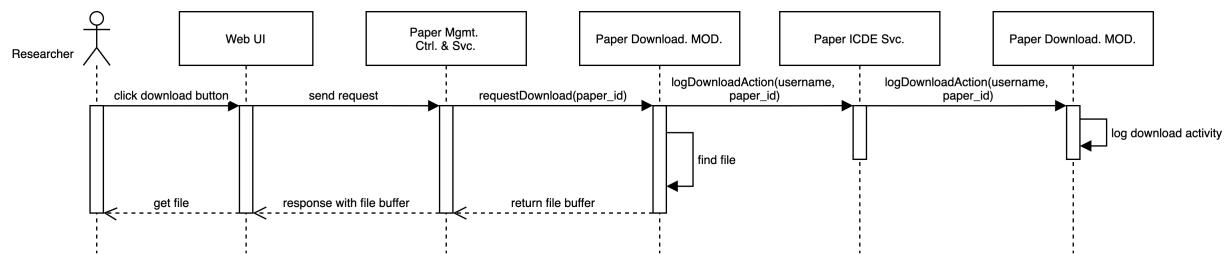


Figure 18: Sequence Diagram for SRS2.1.1

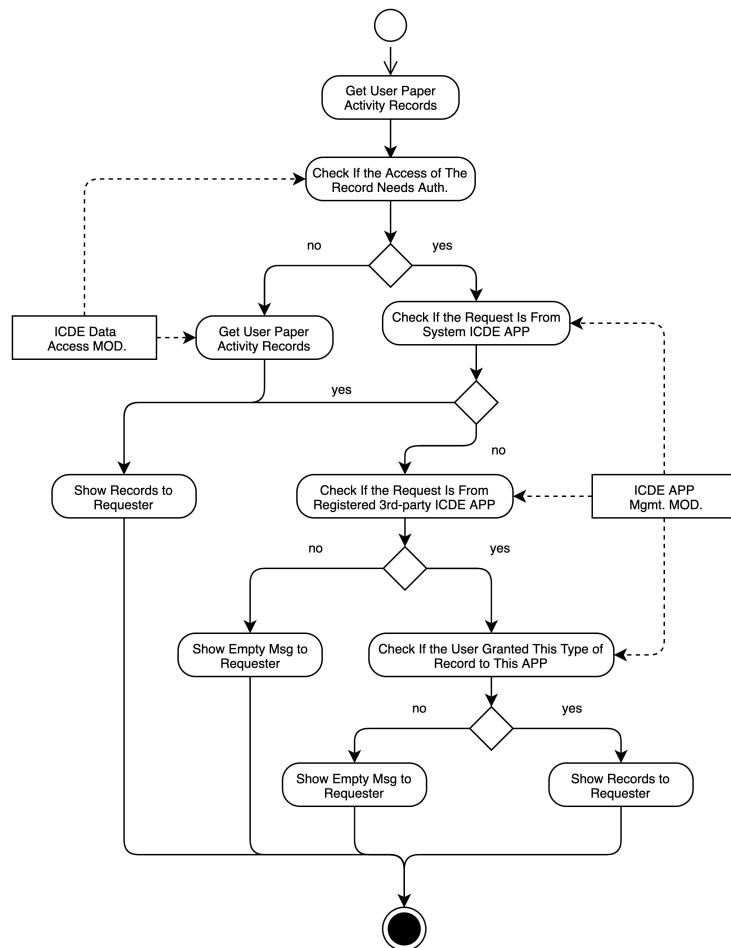


Figure 19: Activity Diagram for SRS 2.1.2, SRS 2.2.4, SRS 4.2, and SRS 5

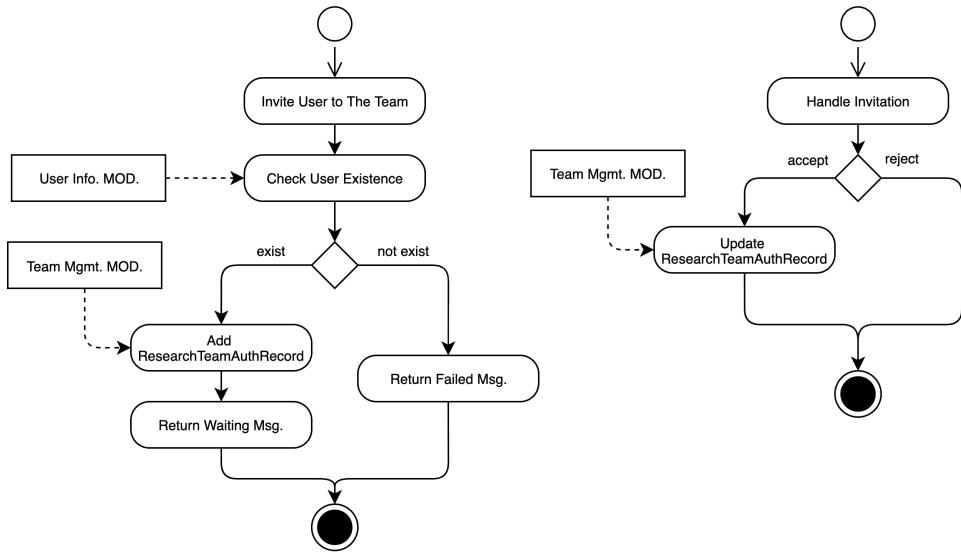


Figure 20: Activity Diagram for SRS 6.1.2

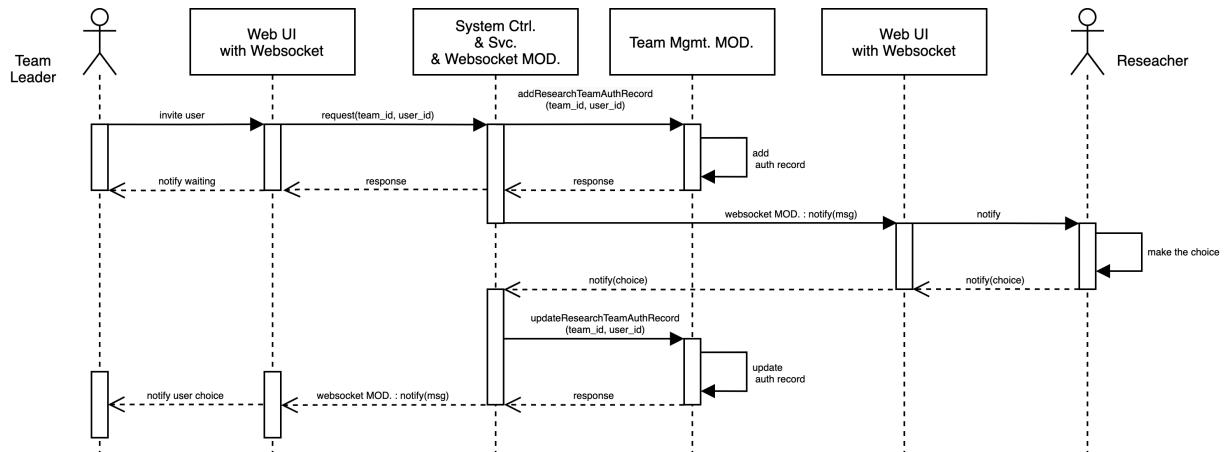


Figure 21: Sequence Diagram for SRS 6.1.2

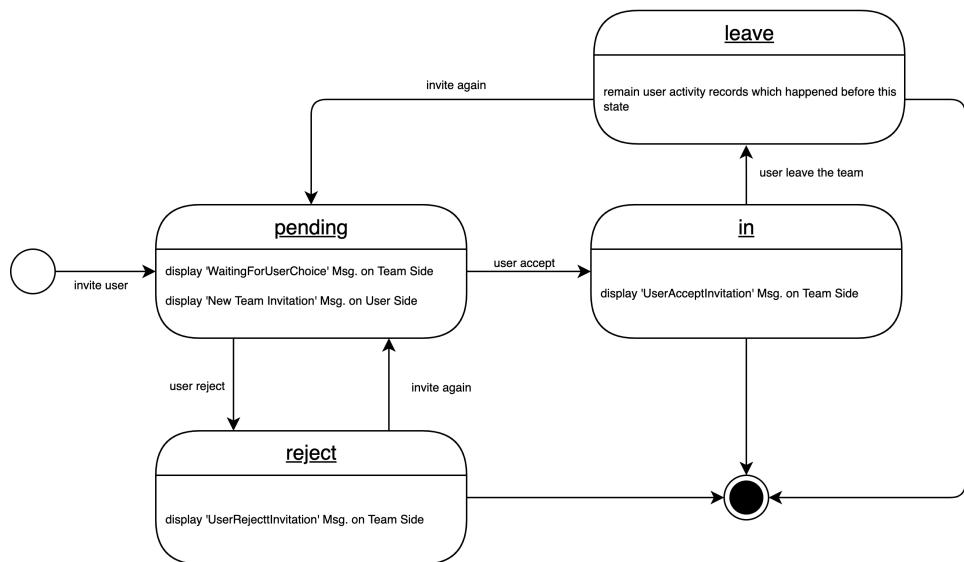


Figure 22: State Diagram for SRS 6.1.2



Stand on the shoulders of giants

Sign in Forgot your account?

Remember me [Forgot my password?](#)

or sign in with:

Facebook Google Apple

Privacy Policy and Terms of Service

Figure 23: Home Page UI

Figure 24: Sign in UI



My Team	My Recent Reading	Recent activities
Team1 Team2 NLP group DL team	<p> Peeking Inside the Black-Box: A Survey on Explainable Artificial Intelligence (XAI)</p> <p> CFD simulation of the atmospheric boundary layer: wall function problems</p> <p> Explainability scenarios: towards scenario-based XAI design</p> <p> Inverting Gradients - How easy is it to break privacy in federated learning?</p> <p> Recent development of mechanisms and control strategies for robot-assisted lower limb rehabilitation</p> <p> Continuous prediction of manufacturing performance throughout the production lifecycle</p> <p>...</p>	<ul style="list-style-type: none"> Andy Hertzfeld added "Machine learning and the physical sciences" to library. Kim Sanders and other 5675 readers like "Continuous prediction of manufacturing performance throughout the production lifecycle" Jamal Chaouki joined Team1

Figure 25: Menu Page UI

Properties Group Filter Sort <input type="button" value="Search..."/> <input type="button" value="New"/>											
+ Add a view	Name	Authors	Authors' affiliation	Tag	Year	Priority	Read	Like	DOI/URL	Num.Likes	
Machine Learning in Agricu <small>OPEN</small>	Konstantinos G. Liakos	University of Turin	Machine Learning Agriculture	2018	Low	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.3390/s1808267	35		
Peeking Inside the Black-Box: A Survey on Explainable Artificial Intelligence (XAI)	Amina Adadi	Abdellah University	XAI Survey	2019	high	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.1109/ACCESS.2018.2870052	772		
Explainability scenarios: towards scenario-based XAI design	Christine T. Wolf	IBM Research	XAI Design	2019	medium	<input checked="" type="checkbox"/>	<input type="checkbox"/>	10.1145/3301275.302317	25		
Machine learning and the physical sciences	Giuseppe Carleo	Flatiron Institute	Machine Learning	2019	high	<input type="checkbox"/>	<input type="checkbox"/>	10.1103/RevModPhys.91.045002	12		
Inverting Gradients - How easy is it to break privacy in federated learning?	Michael Moeller	University of Siegen	Machine Learning ethic	2020	medium	<input checked="" type="checkbox"/>	<input type="checkbox"/>	https://arxiv.org/abs/2003.14053	21		
Machine-learning based error prediction approach for coarse-grid Computational Fluid Dynamics (CG-CFD)	Botros N.Hanna	North Carolina State Univ	Machine Learning CFD	2020	high	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.1016/j.jpnucene.2019.103140	331		
Continuous prediction of manufacturing performance throughout the production lifecycle	Daniel Poindexter	IBM Research	prediction performance lifecycle	2014	Low	<input type="checkbox"/>	<input type="checkbox"/>	https://link.springer.com/article/10.1007/s10845-014-0911-x	2553		
CFD simulation of the atmospheric boundary layer: wall function problems	Bert Blocken	Technische Universiteit Eir	CFD boundary layer	2007	high	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10.1016/j.atmosenv.2006.08.019	6854		
Recent development of mechanisms and control strategies for robot-assisted lower limb rehabilitation	Wei Meng	Wuhan University of Tech	Control Robot	2015	medium	<input type="checkbox"/>	<input type="checkbox"/>	10.1016/j.mechtronics.2015.04.005	752		

Figure 26: My Library UI

Firstname Lastname

Properties	Group	New	Filter	Sort	Search	...	New
Role	Student						
Address	7141 Rue Sherbrooke O, Montréal, QC H4B 1R6						
Email	XXXXXX@mail.concordia.ca						
Mobile	438-941-xxxx						
LinkedIn	www.linkedin.com/						
Resume	Resume.pdf						
Research field	NLP CNN						
+ Add a property							

Figure 27: My Profile UI

Table View Activity

Name	Role	Stage	Email	Attachments	Website	Skills
Michael Kim	Engineering - Front End	Lead	michaelkim@company.com		https://www.linkedin.com/in/m	Front End
Andy Hertzfeld	Proffeser	Lead	hertzfeld@mail.concordia.ca	resume.pdf	https://www.dribbble.com/mic	ML SE
Tim Bakshi	Support Lead	Post-Doc	tim@mail.concordia.ca		https://www.timbakshi.com	Writing
Kim Sanders	Engineering - Front End	Post-Doc	kim.sanders@notion.so		https://www.linkedin.com/in/ki	Back End
Carrie Sandoval	Engineering - Ops	Student	carriesandoval@notion.so		https://www.github.com/carrie	Back End Platform

Figure 28: Team List UI

The screenshot shows a user interface for managing team activity. On the left, there's a sidebar with buttons for 'Team1' (blue), 'Team2' (green), 'NLP group' (yellow), 'DL team' (blue, currently selected), and a '+' button. The main area has a 'Return' link and a 'Team timeline' section. The timeline lists activities such as Kai Wang adding a book to the library, Andy Hertzfeld adding a paper, and Justin Trudeau joining the team. It also shows the creation of the DL team by Andy Hertzfeld. To the right, there's a 'Team likes' section listing items liked by team members like Kai Wang, Kim Sanders, and Andy Hertzfeld. A search bar at the top right is labeled 'Search...'.

Figure 29: Team Activity UI

The screenshot shows a Jira Kanban board titled 'Design Sprint - 1'. The board has columns for 'TO DO', 'IN PROGRESS', and 'DONE 5 ISSUES'. Under 'TO DO', there are two empty boxes. Under 'IN PROGRESS', there are also two empty boxes. Under 'DONE 5 ISSUES', there is a list of tasks: 'System Object Design' (D2 - SYSTEM MODEL & DESIGN, due 21 OCT, assigned to COEN6311-66), 'System Level Architecture' (D2 - SYSTEM MODEL & DESIGN, due 22 OCT, assigned to COEN6311-68), 'SRS Modeling' (D2 - SYSTEM MODEL & DESIGN, due 22 OCT, assigned to COEN6311-67), 'SRS Level Use Cases' (D2 - SYSTEM MODEL & DESIGN, due 22 OCT, assigned to COEN6311-69), and 'Web UI Design (Prototype)' (D2 - SYSTEM MODEL & DESIGN, due 22 OCT, assigned to COEN6311-64). Each task card includes a checkmark icon and a small circular icon with initials (JH, DL, ZW).

Figure 30: Sprint1 Sub-tasks on Jira