ResearchON

Software Engineering Project

BSc(Hons) Computer Science

Batch 2020 - Semester IV - PGDAV COLLEGE

Submitted By:

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Supervisor:

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Acknowledgement

We acknowledge and thank our supervisor for her valuable guidance throughout the duration of the project. Various resources and tools which helped us shape this project are:

- □ Google Docs
- □ Vox.com
- □ Ex Libris
- □ Fluid UI
- □ app.diagrams.net
- □ Tutorials Duniya

We venerate and appreciate the utility of the above tools.

We would also like to thank our parents and friends for being supportive and providing us the opportunity to work on this project.

Certificate

This is to certify that the project titled -“**ResearchON**” has been done by: **SONU** & **SOURAV YADAV** of Bachelor of Science (Honors) in Computer Science during semester IV from **PGDAV College (Day)**-University of Delhi, under the supervision of **Dr. APARNA DATT**.

Declaration

We hereby declare that this Project Report titled “**ResearchON**” submitted to the Department of Computer Science, P.G.D.A.V.(M) College, University of Delhi is a record of original work done by the team under the guidance of Dr. Aparna Datt.

The information and data given in the report is authentic to the best of the team’s knowledge.

This Project Report is **not** submitted to any other university or institution for the award of any degree, diploma or fellowship or published any time before.

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Problem Statement

Scientific research encompasses a wide range of people, including the scientific community and those who get affected by it. Science has its own pros and cons and with it starting to affect peoples' lives and the growing importance of research in today's world, we intend to address the challenges of science. These include: Huge money problems, poorly designed studies, replicated results- rare+crucial, peer review is broken, paid access to Science, stressful life of a young academic.

We aim to create a common platform for research which shall give *access to scientific articles*, take care of things unrelated to research so that the academician can direct his focus to research only. Maintaining ratings based on the research methods- to ensure hierarchy based on method parameters .Peer review variation- increasing accountability of academicians in marking peer's works, number of studies replicated and results confirmed shall encourage researchers to undertake projects which today don't have much demand but are crucial to complete.

So, we intend to provide an atmosphere where funding is based on ratings, methods adopted, and on a roughly equal distribution; encouraging method intensive research than hype related research; and providing access to scholarly articles as liberally as possible which leads to popularization of authentic studies and in turn shall give a boost to results which are based on well defined method of studies and intended to help the society, in general.

Software Lifecycle Model - SPIRAL

WHY AN ITERATIVE METHOD?

Aiming to have a consensus with stakeholders re\garding the requirements is the essence of our project. We cannot and shouldn't risk the project by assuming everything to be static and rigid. The need for a dynamic, requirements savvy and iterative progression makes spiral a good choice.

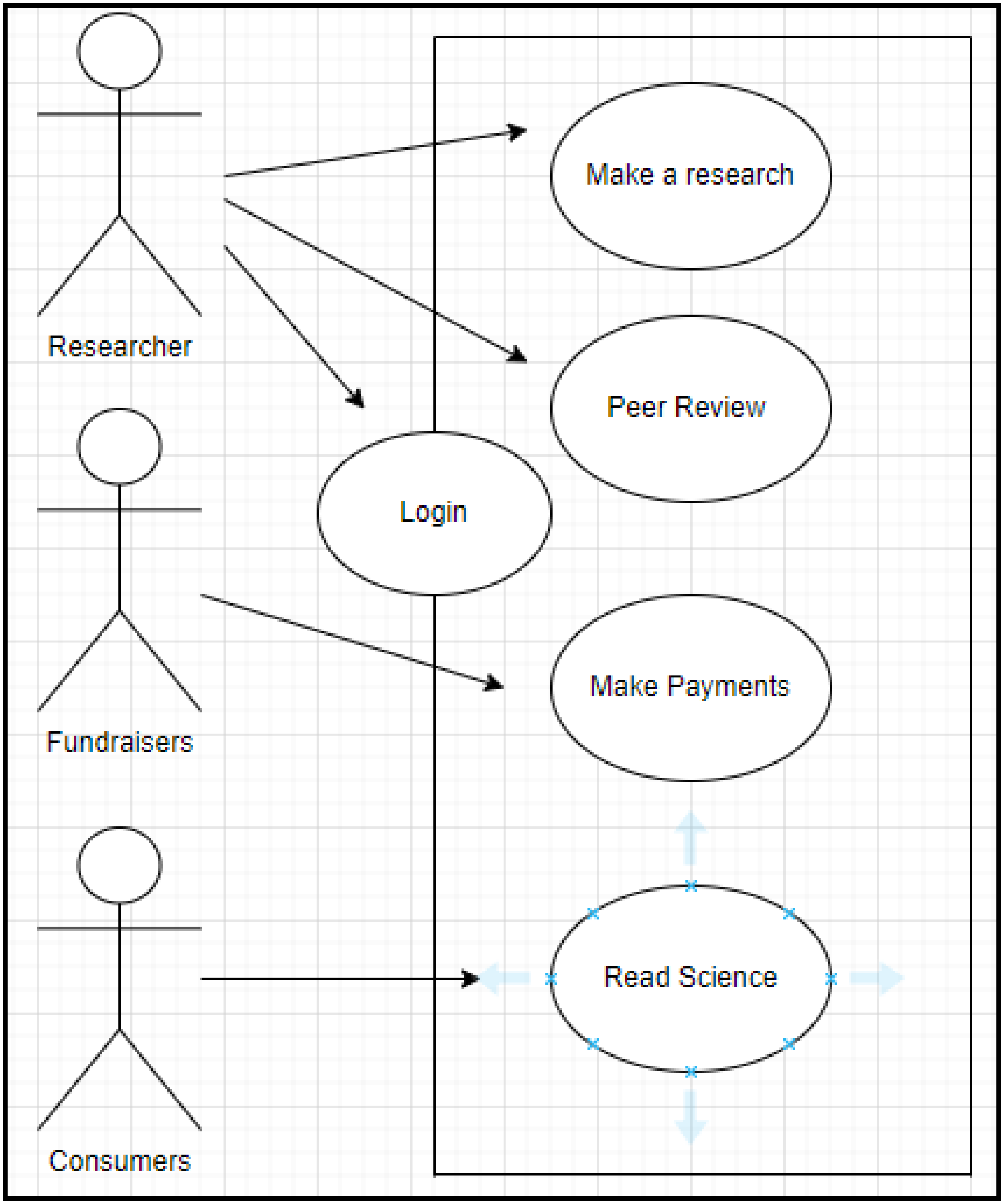
Expectations of the stakeholders are: RESEARCHERS: Announce the start of a research; get funds ; FUNDRAISERS: Get options to invest in ; CONSUMERS: Read Science

This is no way an exhaustive list of expectations. Thus, an iterative process instead of a linear one shall produce a better version in each cycle supplemented with alternatives, risk analysis, user acknowledgement and evolutionary planning.

Why the spiral model suits our needs the best is because we aim to refurbish the existing ideas about research. Thus, we require equal emphasis on planning phase, risk analysis, concepts, testing and evaluation. We aim not to emphasize these parameters, just once like in the waterfall model, neither do we aim to emphasize only user acceptance as in the Rapid prototype model because stakeholders could find their expectations sometimes contradictory to other stakeholders'. So, the Development Team should have a more say in finalizing characteristics of our project based on market research and our aims.

Thus, the **SPIRAL MODEL**, with its peculiarities, suits our needs.

Use Case


Researcher
Fundraisers
Consumers
Make a research
Peer Review
Login
Make Payments
Read Science

Requirements Elicitation

LOGIN

1. Introduction: This use case describes how a researcher logs into the application.
2. Actors: Researcher
3. Pre-Conditions: None
4. Post-Condition: If the use case is successful, then the researcher enters the logged in state. If not, the system is unchanged.
5. Basic Flow: The use case starts when the researcher wishes to login to the application
    - System requests that the actor enter his/her name and password.
    - The actor enters his/her name & password.
    - System validates name & password, and if found correct, allows the actor to log into the system.
6. Alternate Flows:
    - INVALID USERNAME/PASSWORD

      If in the basic flow, the actor enters an invalid name and/or password, the system displays an error message. The actor can choose to either return to the beginning of the basic flow or cancel the login, at that point, the use case ends.

    - NOT REGISTERED

      If the actor is new and not registered, they may choose to register themselves and get a username and password to restart the use case.

ANNOUNCING A RESEARCH

1. Introduction: Allows a researcher to announce a research, update its progress, add fund requests.
2. Actors: Researcher
3. Pre-Conditions: Actor must be logged in to access this state
4. Post-Condition: If use case is successful, then the researcher is able to register a new research, requests for funds and receives *GRAVITY POINTS*.
5. Basic Flow: The use case starts when the researcher wishes to start a new research or update an existing one:

- User requests to announce a new research
- System requires the user to enter details
- The request is registered under a category and gets its *GRAVITY POINTS*.

REVIEWING A RESEARCH

1. Introduction: Allows a researcher to undertake peer reviewing
2. Actors: Fellow Researcher
3. Pre-Conditions: Actor must be logged in to access this state
4. Post-Condition: If the use case is successful, then the researcher is able to mark fellow researcher's work else, the system is redirected to invalid login state.
5. Basic Flow: The use case starts when the researcher wishes to review a work:
    - System allocates a work to the researcher, where both the identity of the researcher and reviewer are masked.
    - User reviews the work based on certain parameters.
    - User receives his *REVIEW MARKS* based on the variability of other reviews and reasons thereof.

FUNDING A RESEARCH

1. Introduction: Allows a user to finance a research project
2. Actors: Fundraiser
3. Pre-Conditions: No pre condition
4. Post-Condition: If the use case is successful, then the fundraiser is able to fund a research project, get her *SAMARITAN POINTS* & advertise.
5. Basic Flow: The use case starts when the user wishes to fund a research project:
    - System displays the list of all projects awaiting funding with their *GRAVITY POINTS* , with all the details of the researcher masked.
    - User chooses to fund any project from the list.
    - User receives her *SAMARITAN POINTS* based on the amount, *GRAVITY POINTS* of the research.
    - System adds the user to the ranking of *SAMARITANS* and advertises the content of the user, provided she logs in and earns a good *SAMARITAN RANK.*

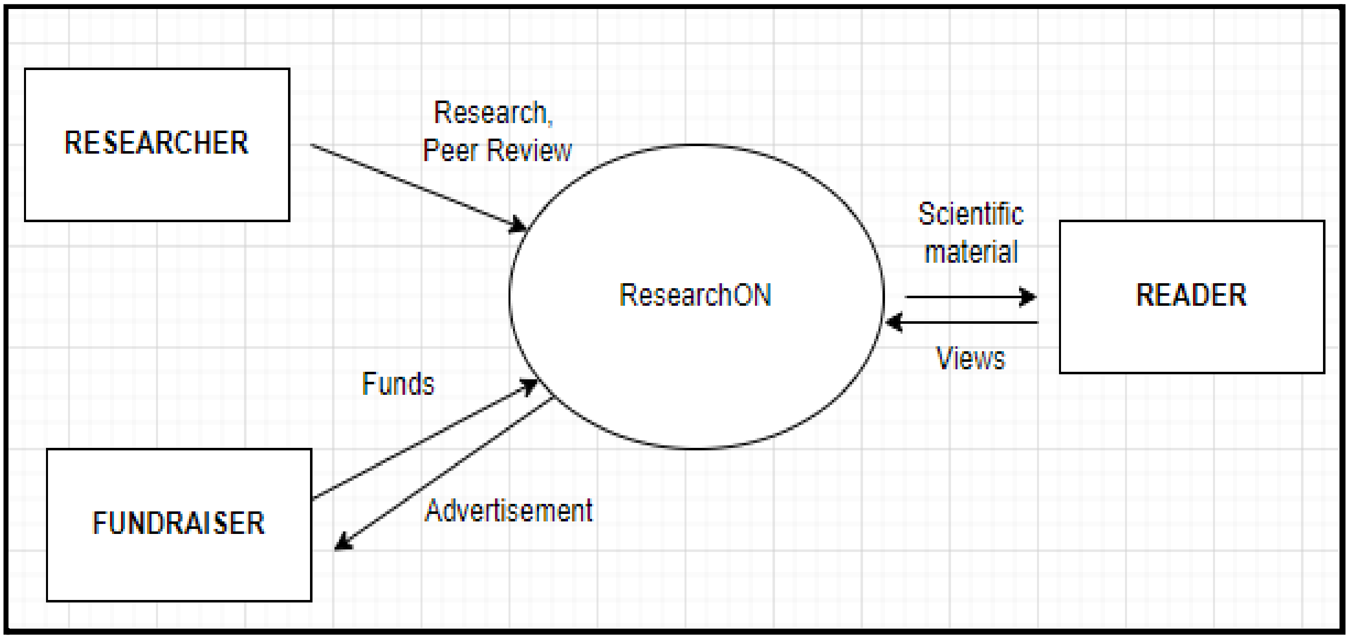
READING SCIENCE

1. Introduction: Allows a user to read science
2. Actors: Consumer
3. Pre-Conditions: No Pre conditions

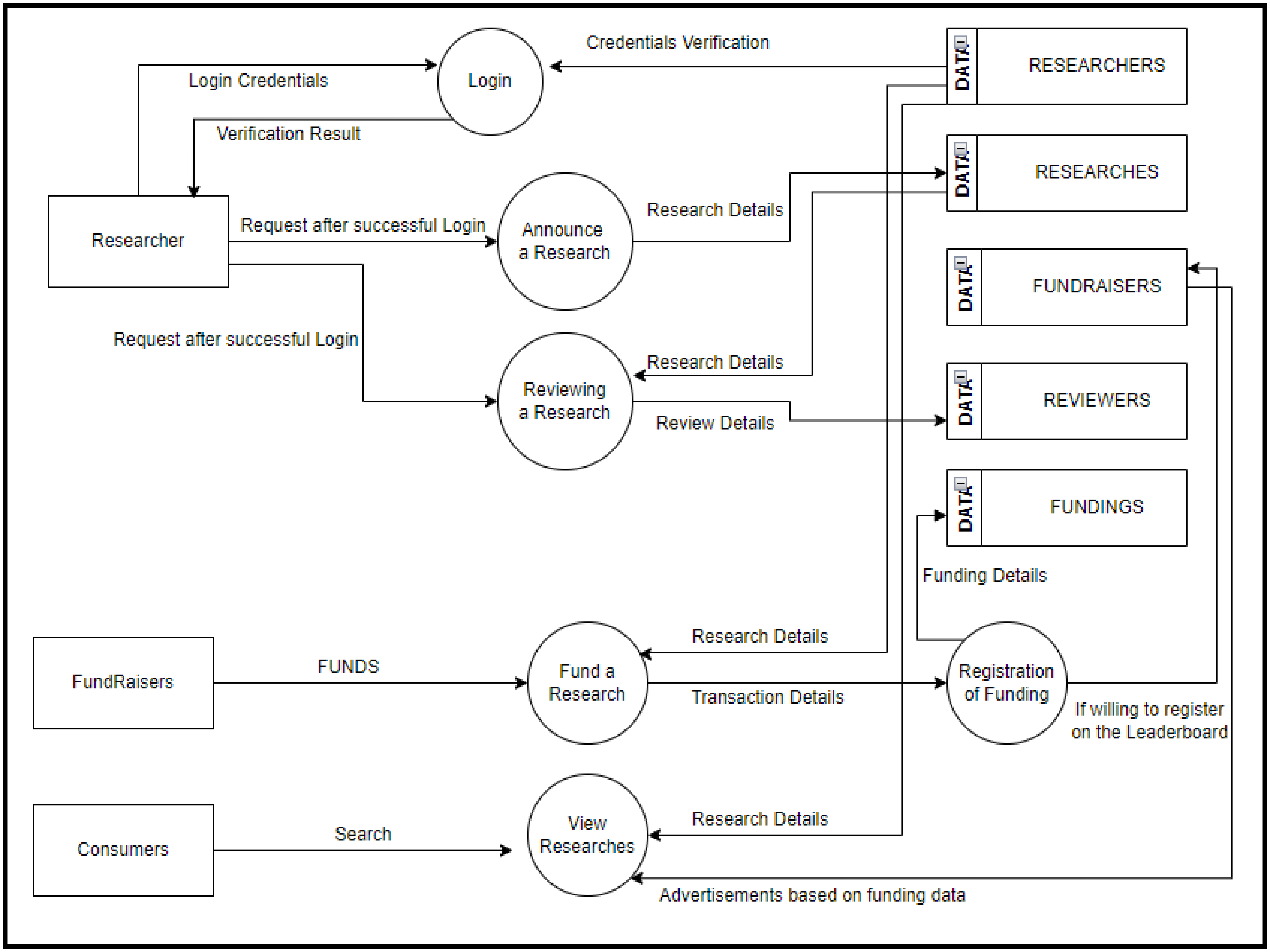
4. Post-Condition: If the use case is successful, then the user is able to read articles, projects on any topic she wishes to.
5. Basic Flow: The use case starts when the user wishes to read science:
   - User enters a keyword to search.
   - System displays results pertaining to the search.
   - User reads from the links available.
   - The User can register a research request for a certain topic, which shall contribute to the *GRAVITY POINTS* of a research matter.

Data Flow Diagram

Level - 0

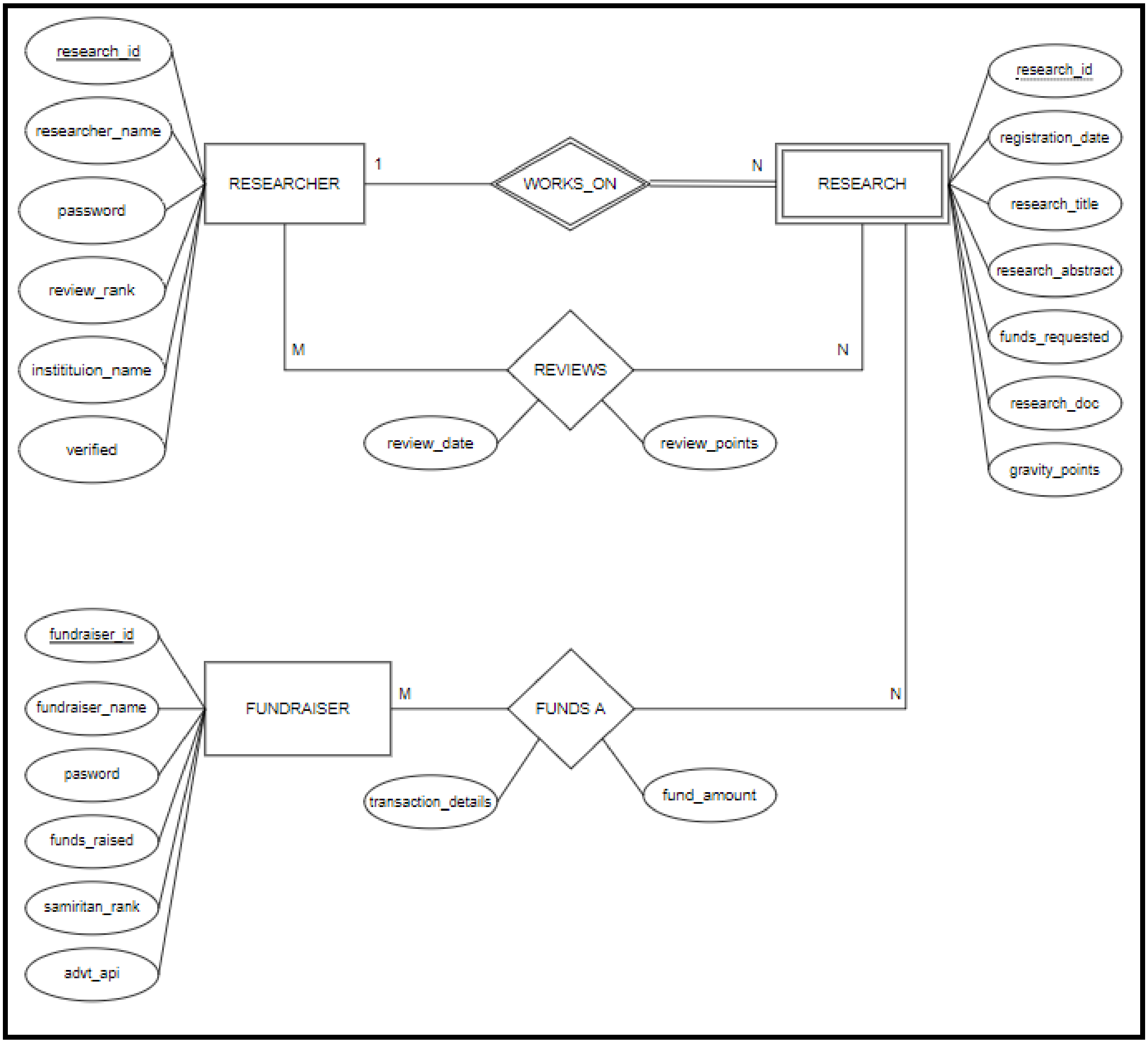


Level -1

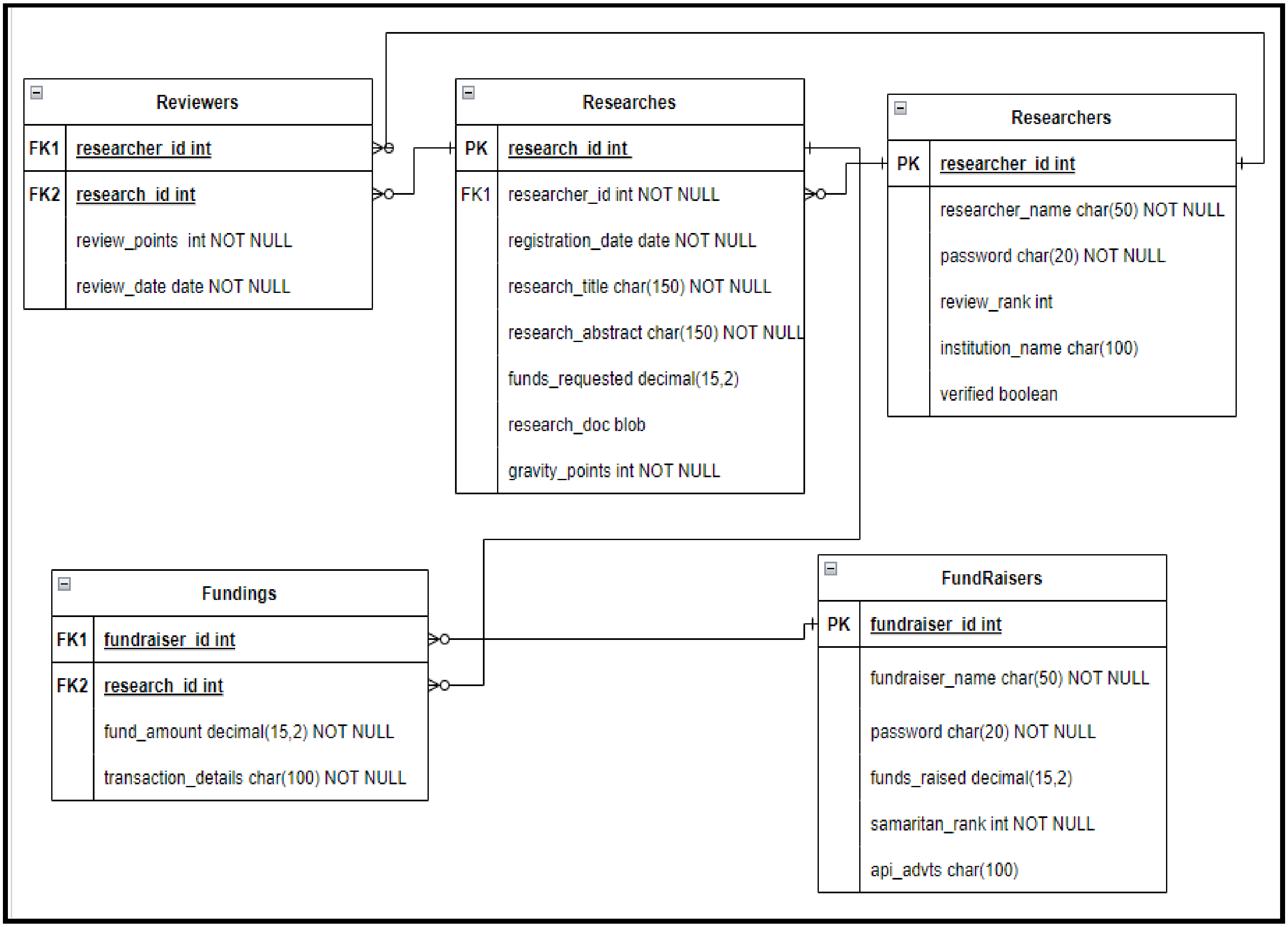


Login Credentials
Login
Credentials Verification
Verification Result
Researcher
Request after successful Login
Announce a Research
Research Details
Request after successful Login
Reviewing a Research
Research Details
Review Details
DATA
RESEARCHERS
DATA
RESEARCHES
DATA
FUNDRAISERS
DATA
REVIEWERS
DATA
FUNDINGS
Funding Details
FundRaisers
FUNDS
Fund a Research
Research Details
Transaction Details
Registration of Funding
If willing to register on the Leaderboard
Consumers
Search
View Researches
Research Details
Advertisements based on funding data

Entity Relationship Diagram



Relational Mapping



Reviewers	
FK1	researcher_id int
FK2	research_id int
	review_points int NOT NULL
	review_date date NOT NULL

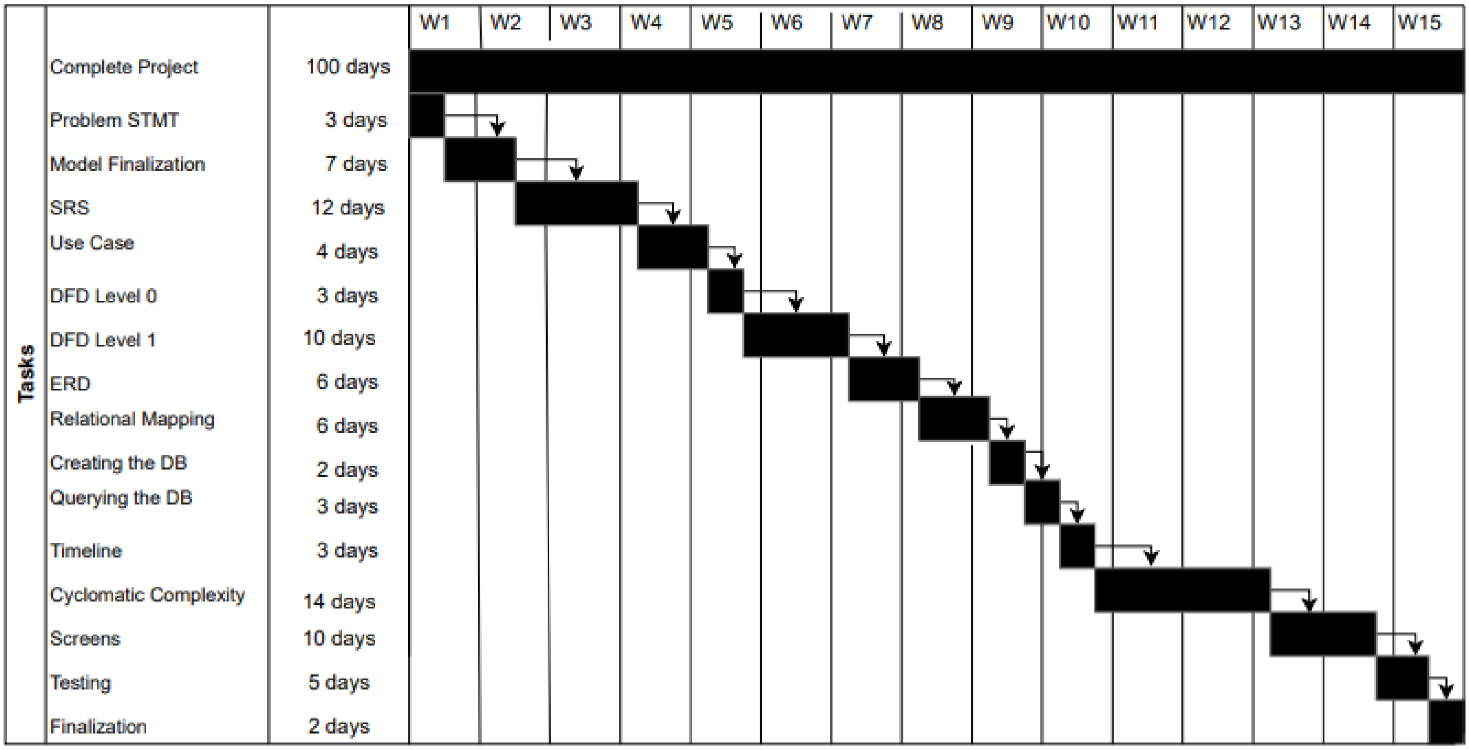
Researches	
PK	research_id int
FK1	researcher_id int NOT NULL
	registration_date date NOT NULL
	research_title char(150) NOT NULL
	research_abstract char(150) NOT NULL
	funds_requested decimal(15,2)
	research_doc blob
	gravity_points int NOT NULL

Researchers	
PK	researcher_id int
	researcher_name char(50) NOT NULL
	password char(20) NOT NULL
	review_rank int
	institution_name char(100)
	verified boolean

Fundings	
FK1	fundraiser_id int
FK2	research_id int
	fund_amount decimal(15,2) NOT NULL
	transaction_details char(100) NOT NULL

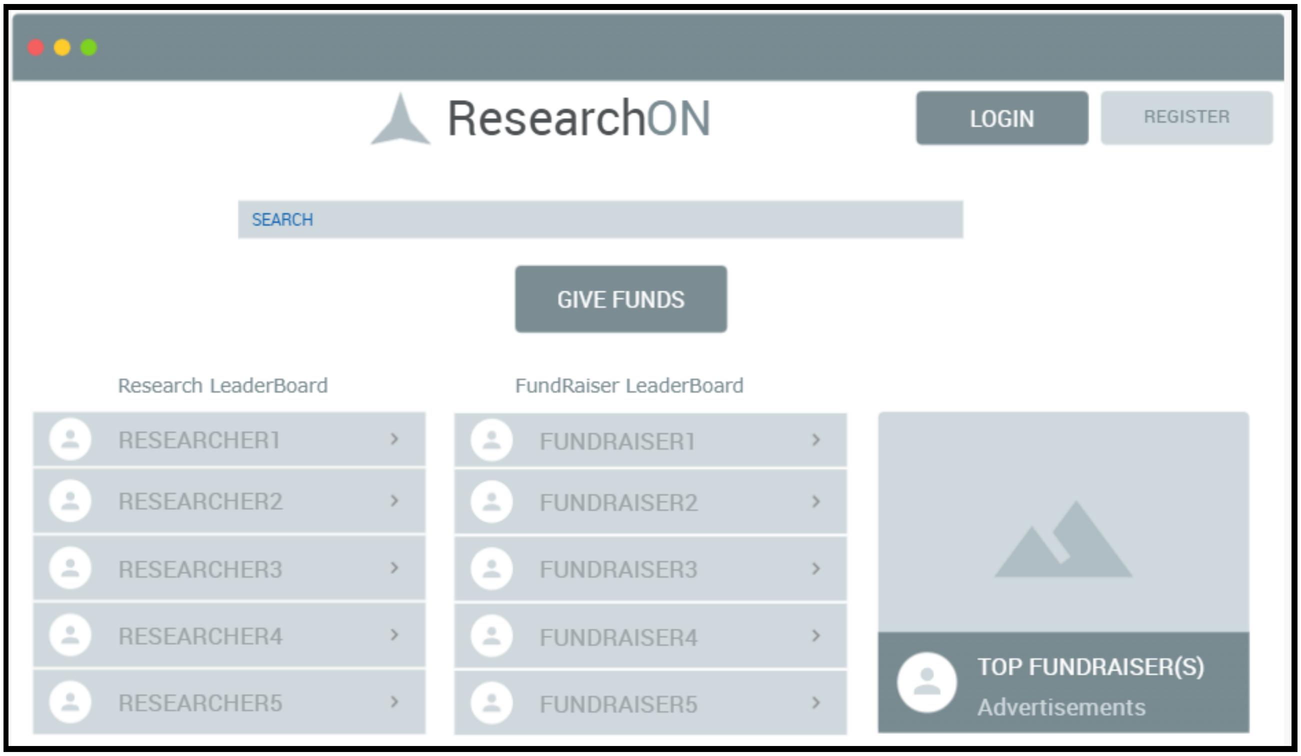
FundRaisers	
PK	fundraiser_id int
	fundraiser_name char(50) NOT NULL
	password char(20) NOT NULL
	funds_raised decimal(15,2)
	samaritan_rank int NOT NULL
	api_advts char(100)

Timeline

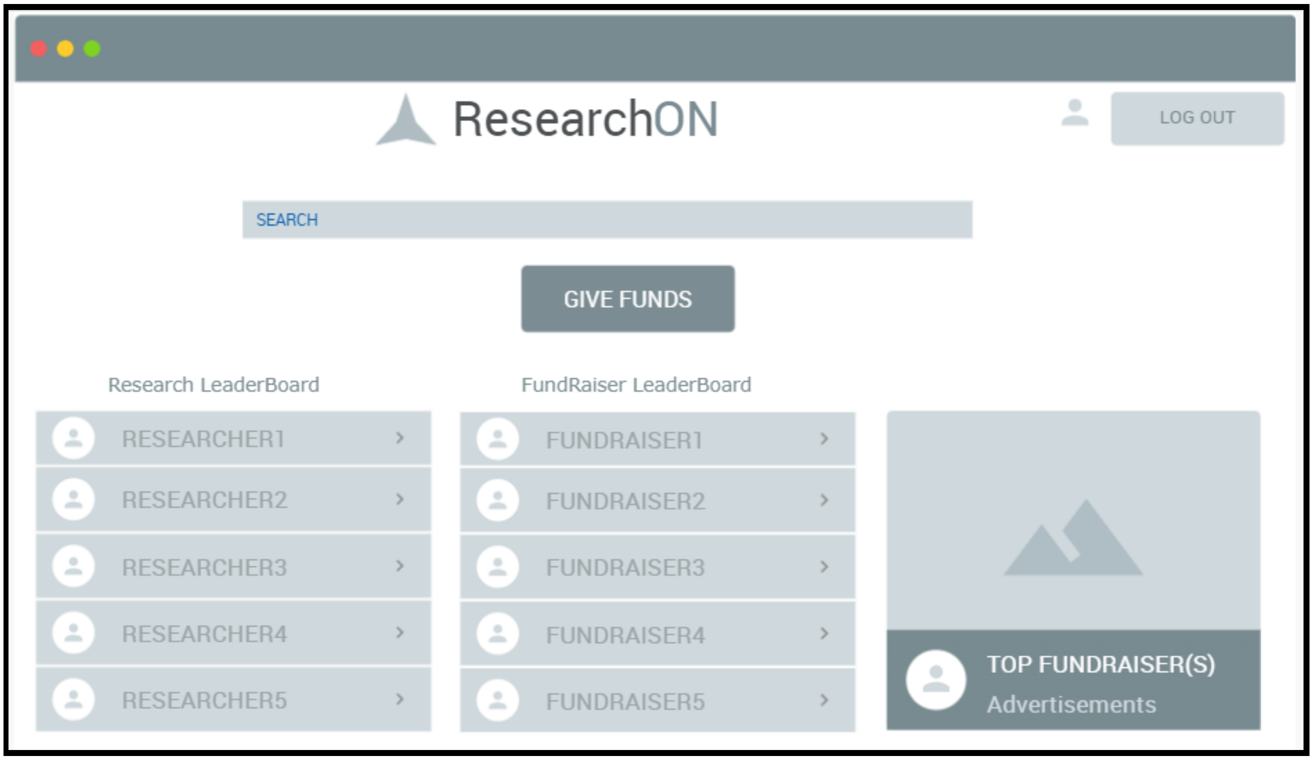


Tasks	
Complete Project	100 days
Problem STMT	3 days
Model Finalization	7 days
SRS	12 days
Use Case	4 days
DFD Level 0	3 days
DFD Level 1	10 days
ERD	6 days
Relational Mapping	6 days
Creating the DB	2 days
Querying the DB	3 days
Timeline	3 days
Cyclomatic Complexity	14 days
Screens	10 days
Testing	5 days
Finalization	2 days

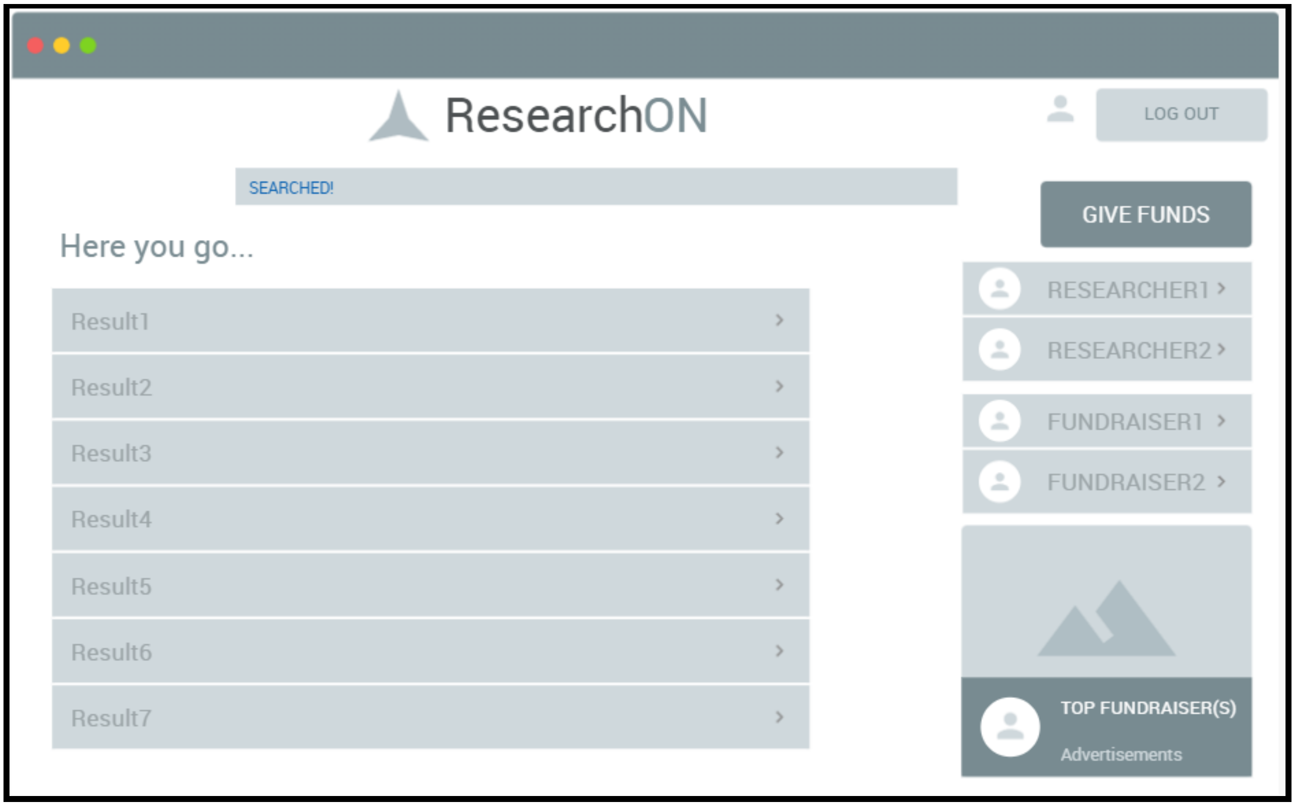
Screens



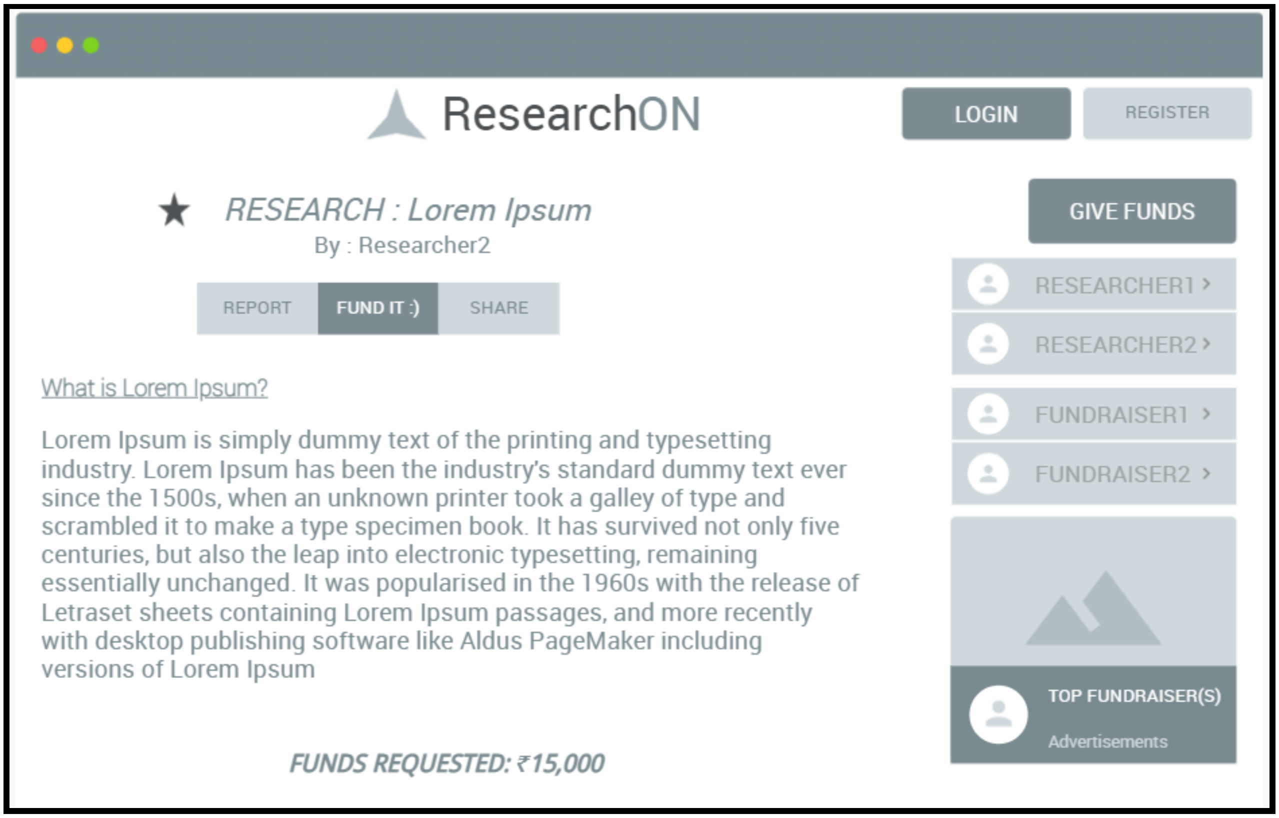
- **HOME SCREEN**



- **HOME SCREEN-LOGGED IN**



- **SEARCHING A RESEARCH**



★ *RESEARCH : Lorem Ipsum*

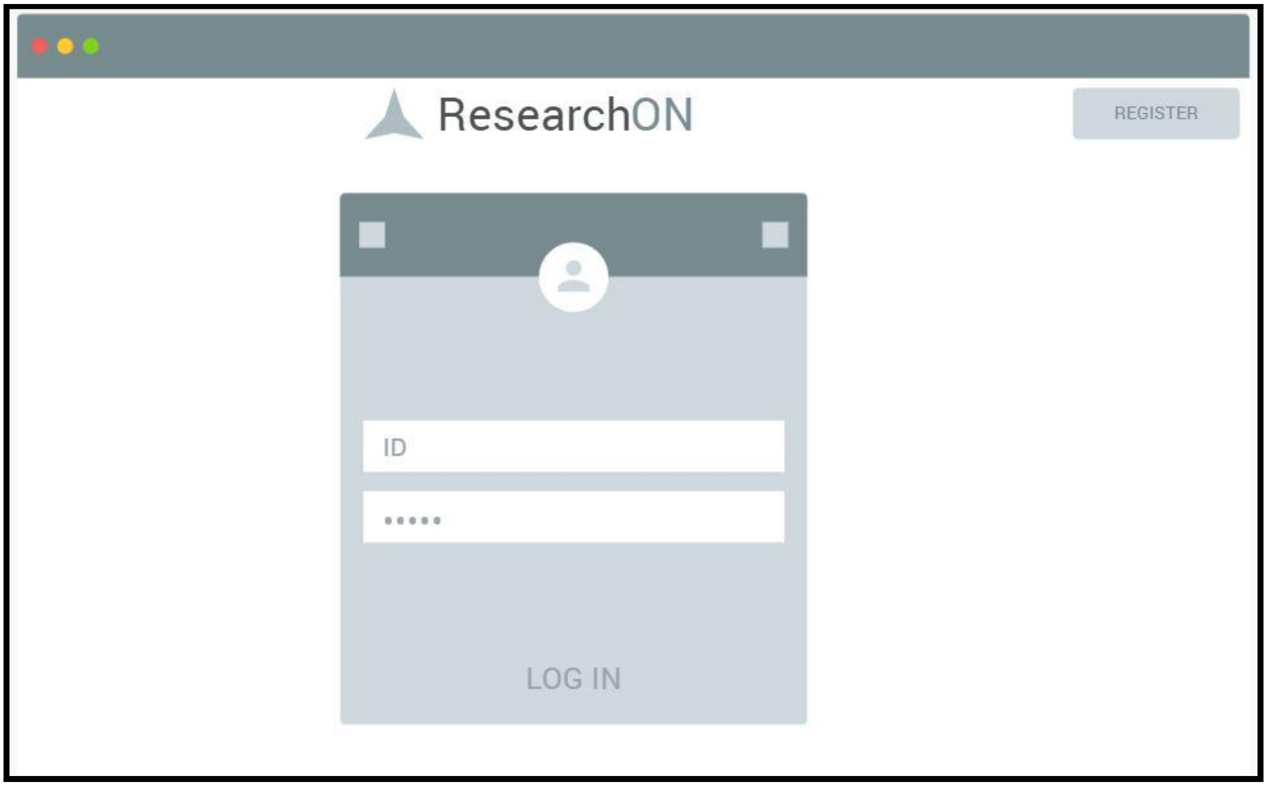
By : Researcher2

What is Lorem Ipsum?

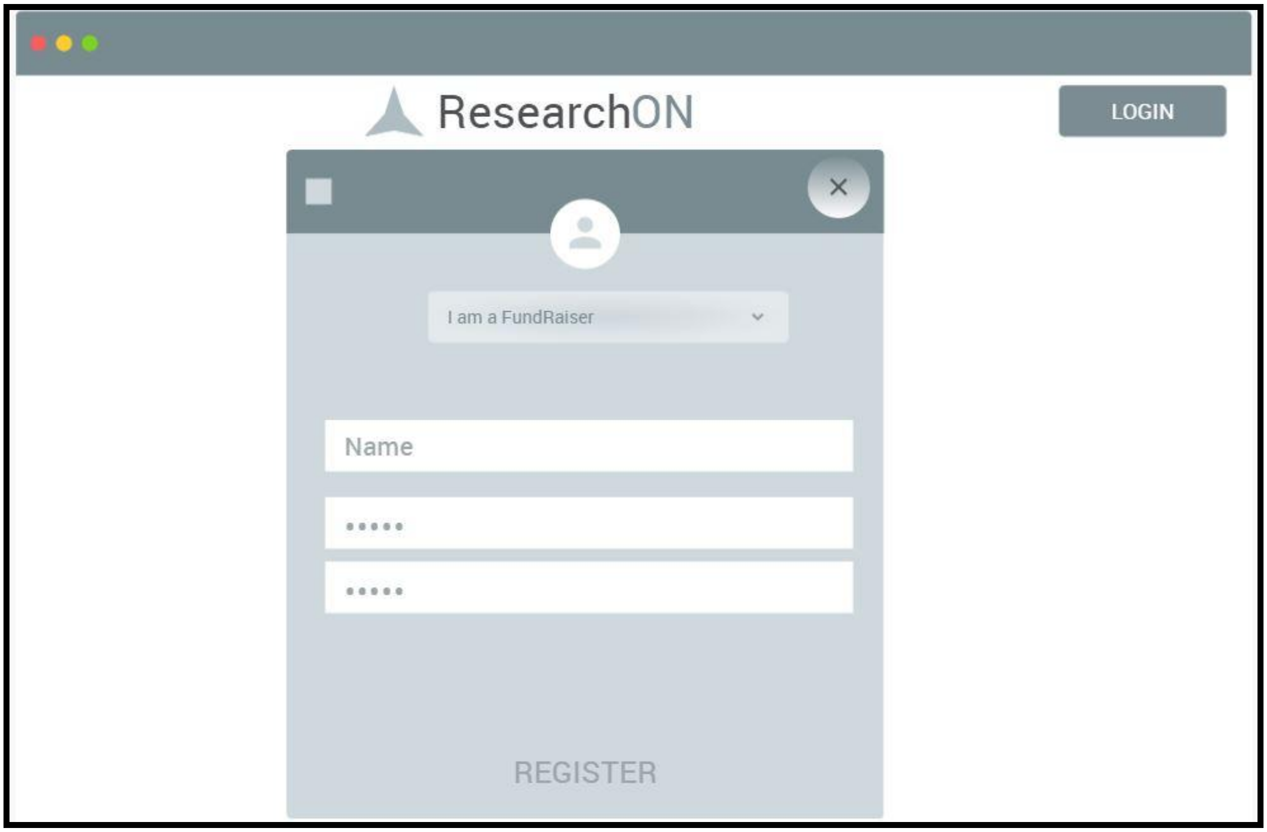
Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum

FUNDS REQUESTED: ₹15,000

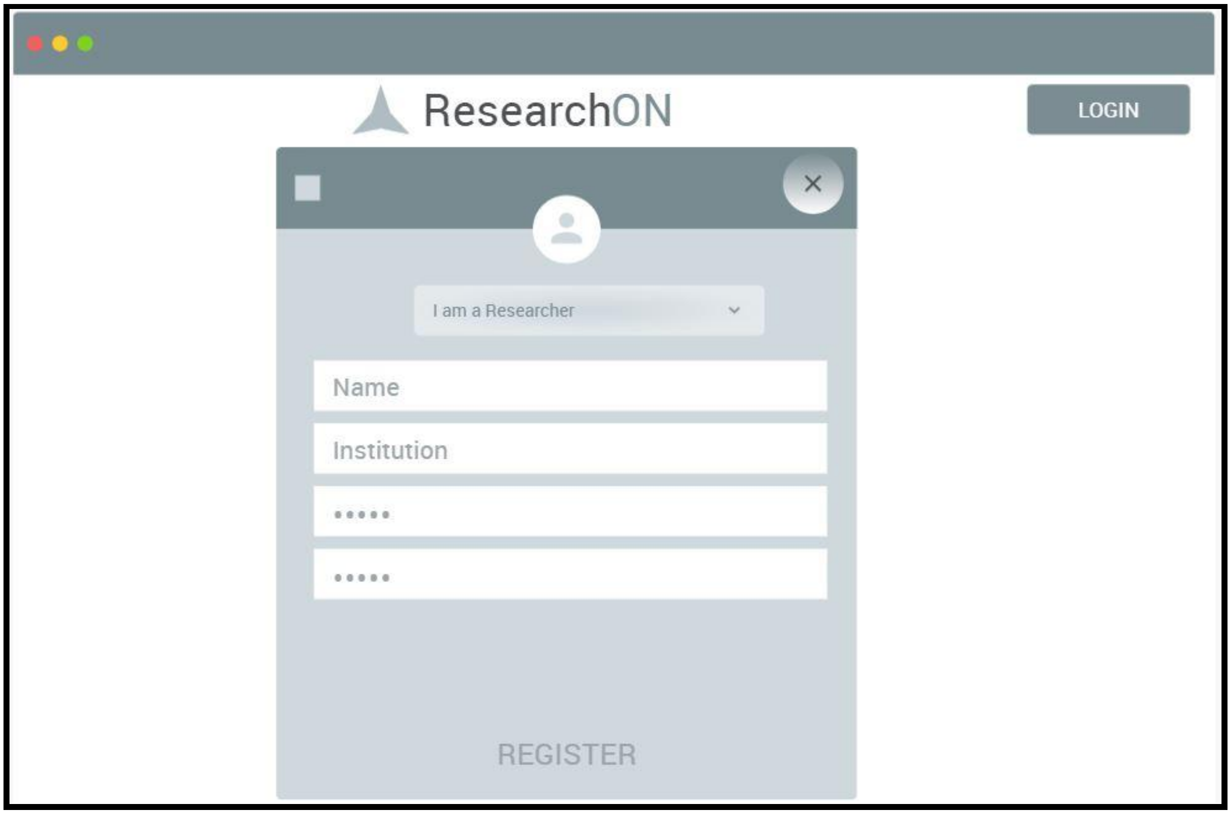
- **VIEWING A RESEARCH**



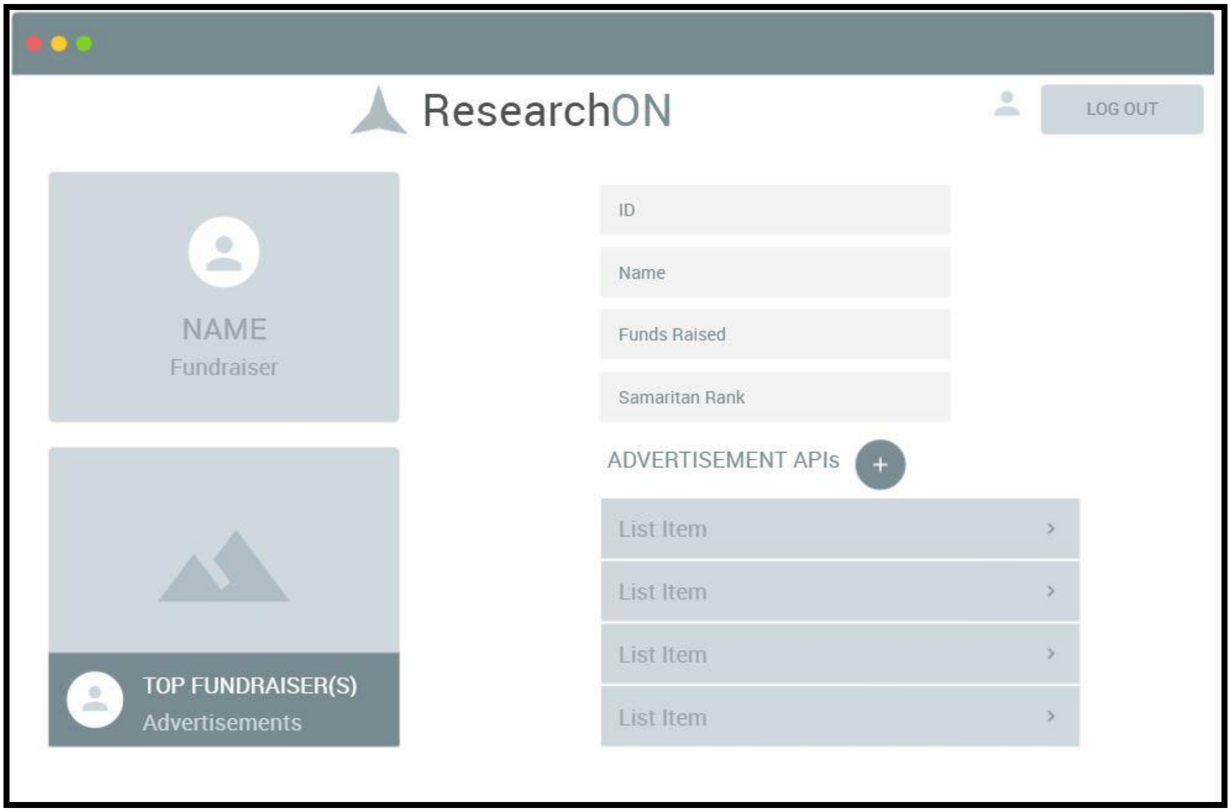
- **LOGIN MODULE**



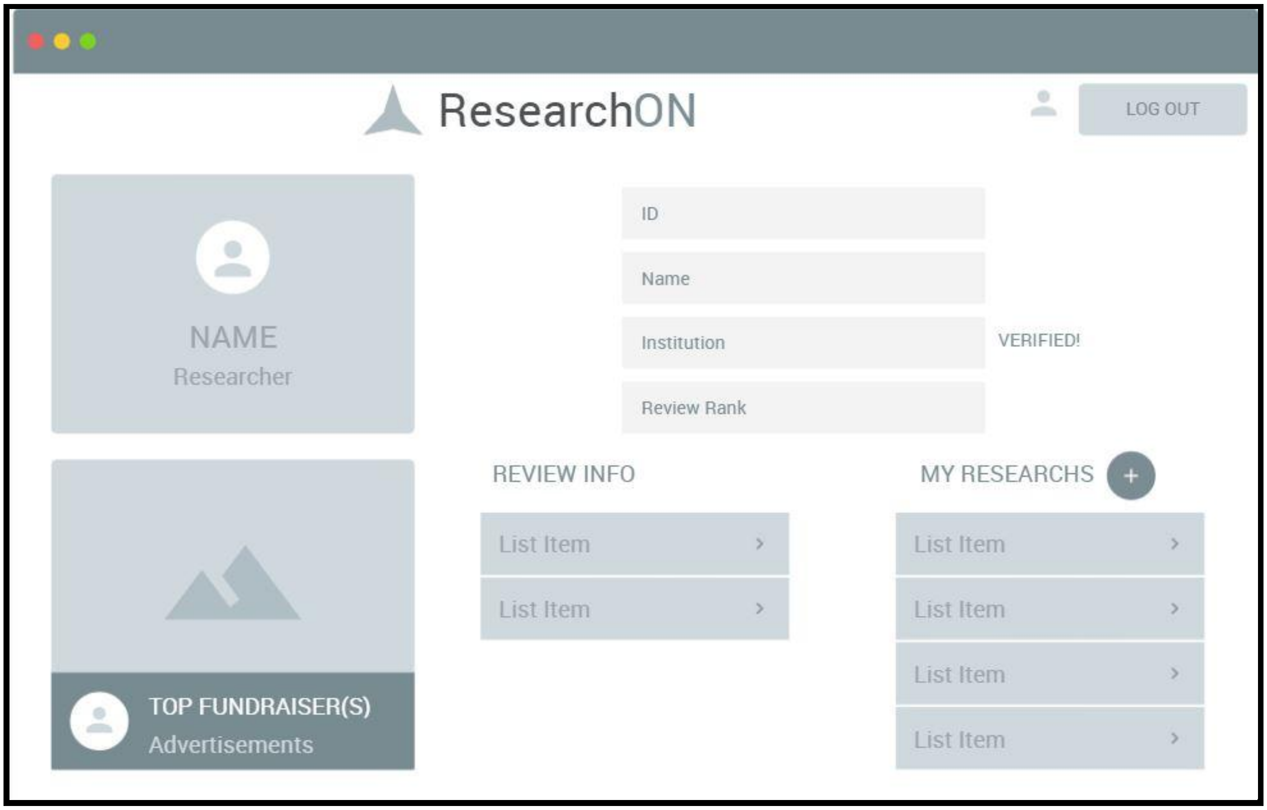
- **REGISTRATION-FUNDRAISER**



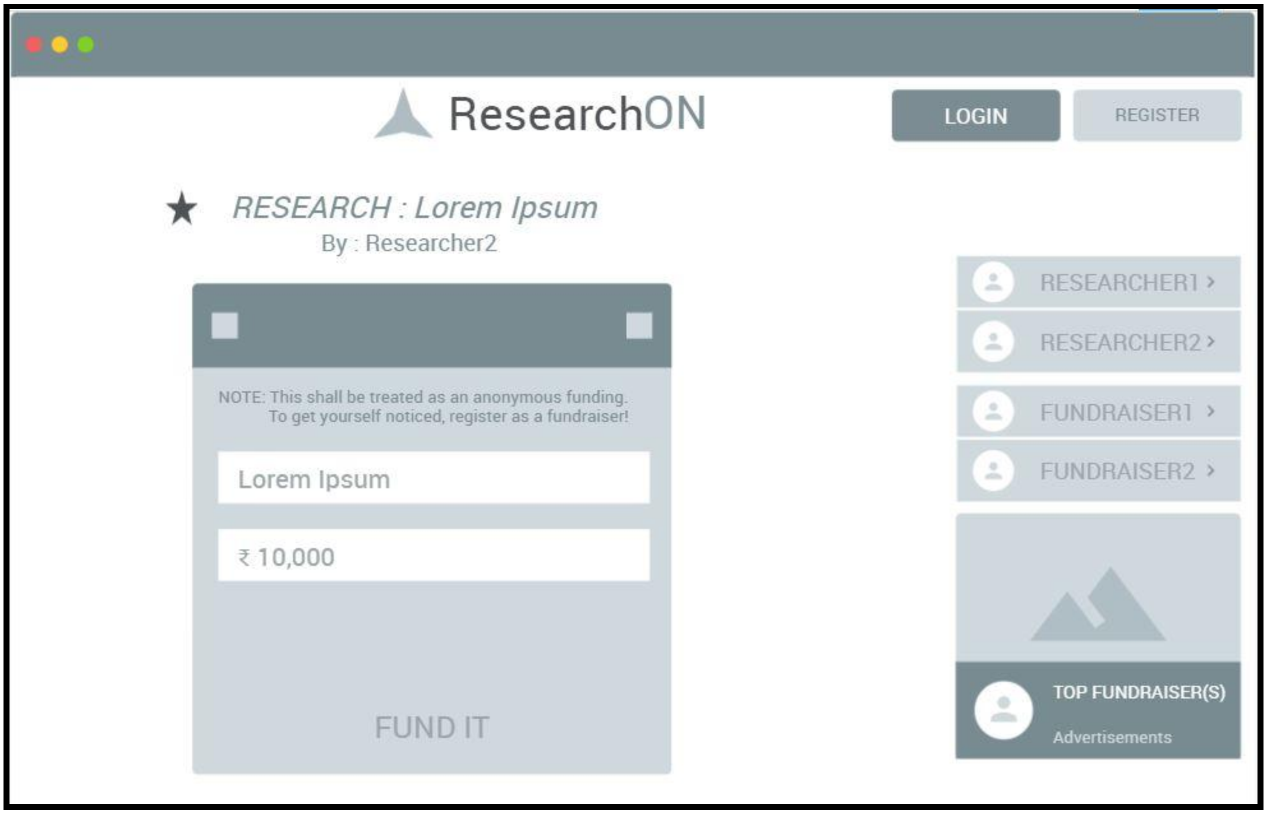
- **REGISTRATION-RESEARCHER**



- **DASHBOARD-FUNDRAISER**



- **DASHBOARD-RESEARCHER**



NOTE: This shall be treated as an anonymous funding. To get yourself noticed, register as a fundraiser!

Lorem Ipsum

₹ 10,000

- **FUNDING WITHOUT REGISTRATION**

Functional Point Estimation

- ➔ **VALUE ADJUSTMENT FACTORS**

		GRADE VALUE
1.	Does the system require reliable backup and recovery?	**5**
2.	Are specialized data communications required to transfer information to or from the application?	**3**
3.	Are there distributed processing functions?	**2**
4.	Is performance critical?	**4**
5.	Will the system run in an existing, heavily utilized operational environment?	**4**
6.	Does the system require online data entry?	**5**
7.	Does the online data entry require the input transaction to be built over multiple screens or operations?	**2**
8.	Are the ILFs updated online?	**3**
9..	Are the inputs, outputs, files, or inquiries complex?	**3**
10.	Is the internal processing complex?	**2**
11.	Is the code designed to be reusable?	**3**
12.	Are conversion and installation included in the design?	**3**
13.	Is the system designed for multiple installations in different organizations?	**3**
14.	Is the application designed to facilitate change and ease of use by the user?	**5**

- **COMPUTING FUNCTION POINTS**

Information Domain Value	Count		Weighting Factor				
			Simple	Average	Complex		
External Inputs(EIs)	4	*	**3**	4	6	=	12
External Outputs(EOs)	3	*	**4**	5	7	=	12
External Inquiries(EQs)	3	*	**3**	4	6	=	9
Internal Logical Files(ILFs)	3	*	**7**	10	15	=	21
External Interface Files(EIFs)	0	*	**5**	7	10	=	0
COUNT TOTAL							54

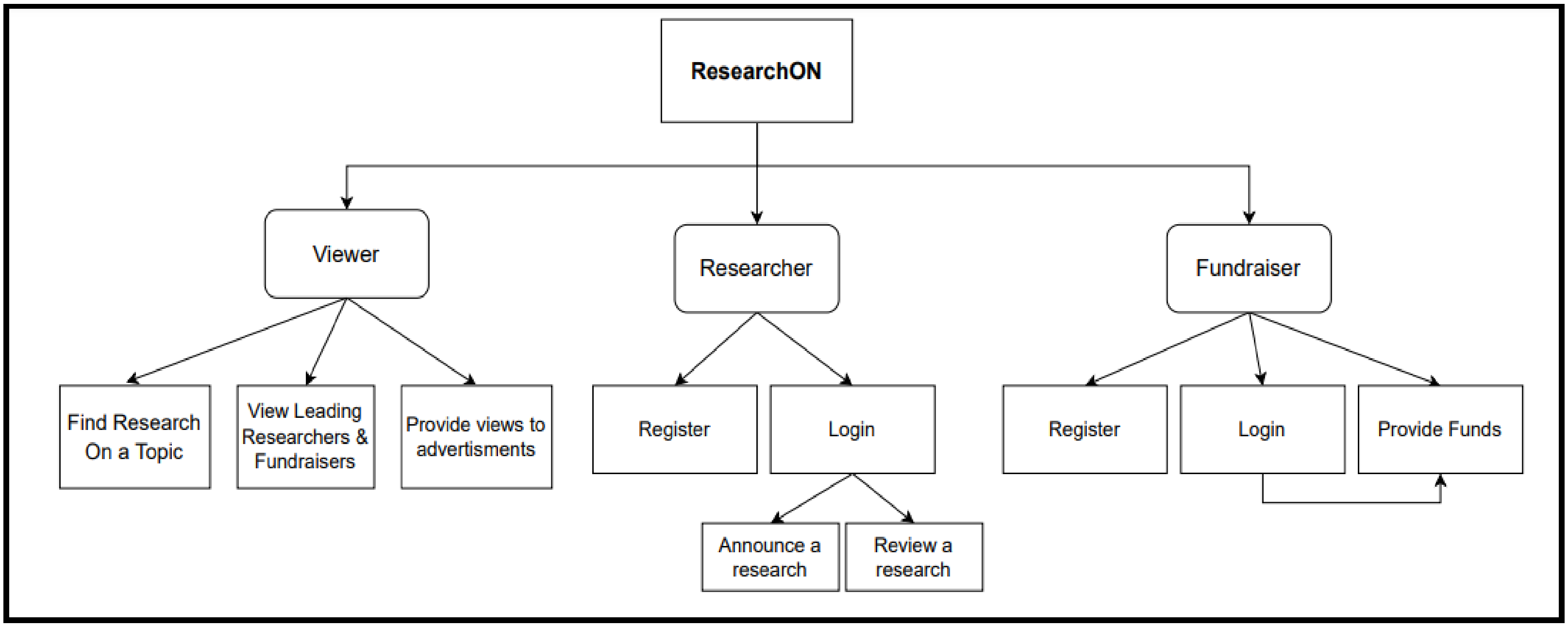
FP = Count_Total x [0.65 + 0.01 x ∑ (Fi)] *where, Count_Total=**54**, ∑(Fi) = **47***

Thus, FP is = 54* [0.65 + (0.01 * 47)] = **60.48**

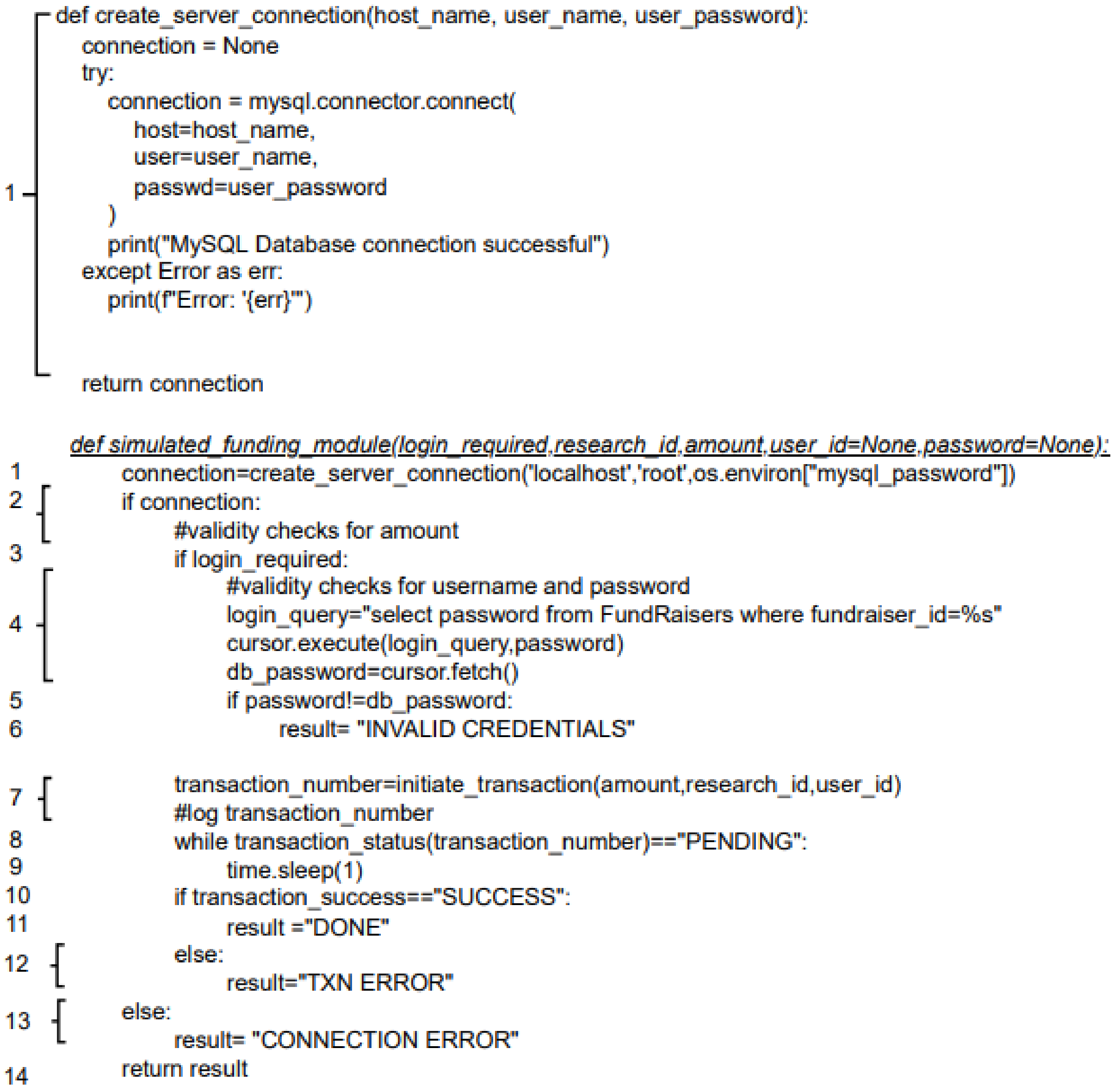
Risk Analysis

S.NO.	RISK	CATEGORY	PROBABILITY	IMPACT	EXPOSURE	RMMM PLAN
1	DELIVERY DEADLINE TIGHTENED	PROJECT RISK	10%	2	0.2	TEAM MAY USE EXTRA MEMBERS TO DO JOB ON SCHEDULED TIME
2	LOSING OF ALL PROJECT DATA THIS MAY HAPPEN DUE TO HARD DISK FAILURE	TECHNICAL RISK	10%	3	0.3	CARRY OUT BACKUP OF ESSENTIAL DATABASES,SOURCE CODE ETC.
3	SOME TEAM MEMBERS LEAVE THE PROJECT IN BETWEEN	PROJECT RISK	5%	2	0.1	USE BACKUP STAFFS WHO KNOWS WHAT WAS GOING ON PROJECT
4	TEAM DISTENSION/LACK OF COHESION	PROJECT RISK	5%	2	0.1	WE MAKE SOME RULES ON HOW WE CONSULT EACH OTHER

Architectural Design



Coding Level Design



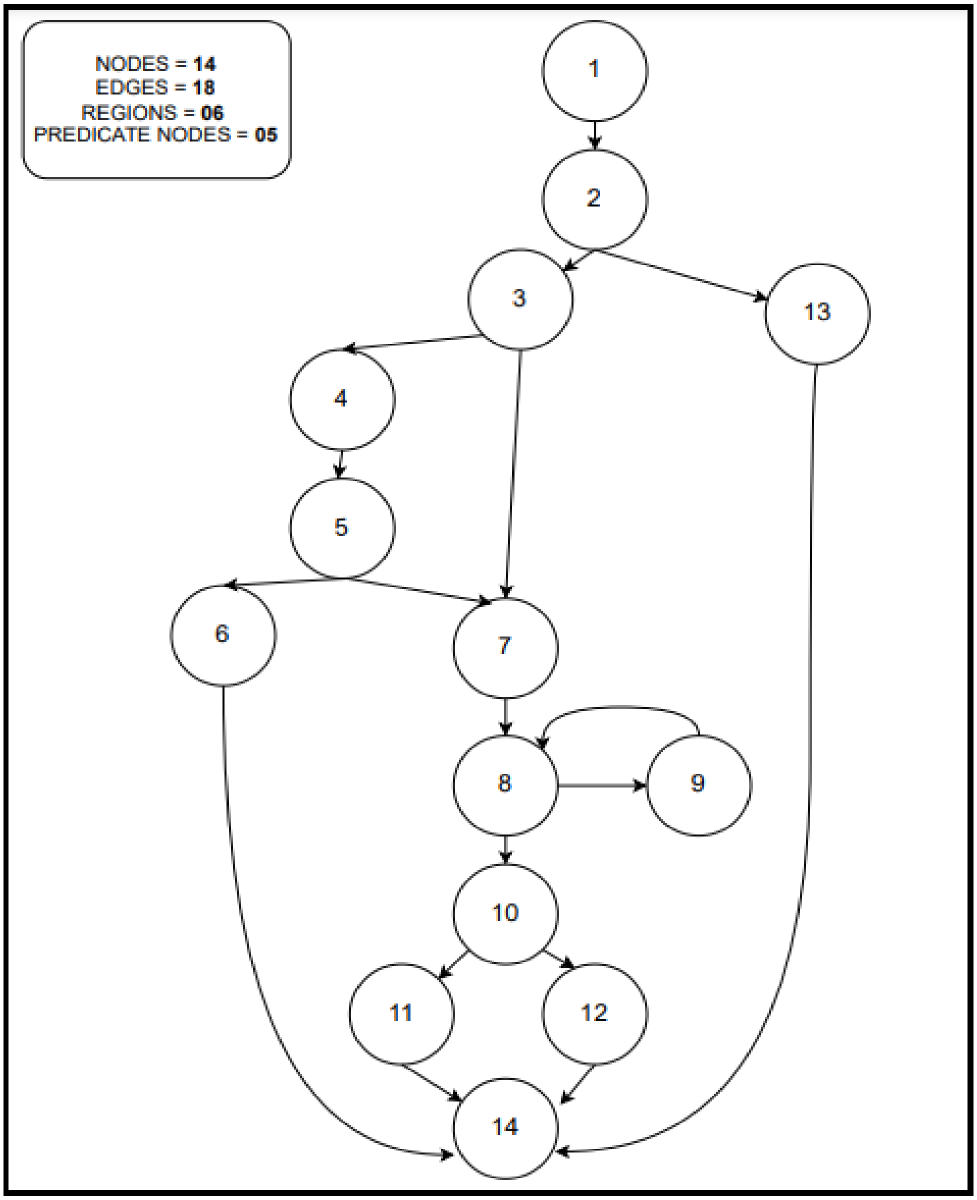
```
   def create_server_connection(host_name, user_name, user_password):
       connection = None
       try:
           connection = mysql.connector.connect(
               host=host_name,
               user=user_name,
1              passwd=user_password
           )
           print("MySQL Database connection successful")
       except Error as err:
           print(f"Error: '{err}'")


       return connection
```

```
     def simulated_funding_module(login_required,research_id,amount,user_id=None,password=None):
1        connection=create_server_connection('localhost','root',os.environ["mysql_password"])
2        if connection:
             #validity checks for amount
3            if login_required:
                 #validity checks for username and password
4                login_query="select password from FundRaisers where fundraiser_id=%s"
                 cursor.execute(login_query,password)
                 db_password=cursor.fetch()
5                if password!=db_password:
6                    result= "INVALID CREDENTIALS"

7            transaction_number=initiate_transaction(amount,research_id,user_id)
             #log transaction_number
8            while transaction_status(transaction_number)=="PENDING":
9                time.sleep(1)
10           if transaction_success=="SUCCESS":
11               result ="DONE"
12           else:
                 result="TXN ERROR"
13       else:
             result= "CONNECTION ERROR"
14       return result
```

Control Flow Graph



CYCLOMATIC COMPLEXITY:

- □ Number of Regions= **6**
- □ Number of Predicate Nodes + 1 = **6**
- □ Count(Edges) - Count(Nodes) + 2 = 18-14+2 => **6**

INDEPENDENT PATHS (6) :

A. 1 -> 2 -> 13 -> 14
B. 1 -> 2 -> 3 -> 7 -> 8 -> 9 -> 10 -> 12 -> 14
C. 1 -> 2 -> 3 -> 7 -> 8 -> 9 -> 10 -> 11 -> 14
D. 1 -> 2 -> 3 -> 4 -> 5 -> 6 -> 14
E. 1 -> 2 -> 3 -> 4 -> 5 -> 7 -> 8 -> 9 -> 10 -> 11 -> 14
F. 1 -> 2 -> 3 -> 4 -> 5 -> 7 -> 8 -> 9 -> 10 -> 12 -> 14

Test Cases

- □ **Component Based Test Cases**

S.No	*User_id*	*Password*	*Amount*	*Research_id*	*Transaction Status*	*Expected Result*
1	None	None	₹1000	2	SUCCESS	**DONE**
2	FR0001	WRONG-PWD	₹1000	1	N/A	**INVALID CREDENTIALS**
3	FR0001	CORRECT-PWD	₹1000	3	FAILURE	**TXN ERROR**

- □ **General Test Cases**
    - Funds to be allocated based on a pseudo random process - randomness given a set of gravity points.
    - More weightage of gravity points of a research than the fund amount in determining SAMARITAN RANK of fundraisers
    - Priority for advertisements to be based on SAMARITAN RANK of fundraisers.
    - Research reviews and funding to be independent of Researcher’s background.
    - Replicated Research => Greater Gravity Points

Bibliography

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—END OF PROJECT—