



Al-Azhar University
Faculty of Engineering
Computers & Systems Engineering Department

WEB PAGE RANKING

SEO SUGGESTION SEARCH ENGINE PROJECT

(*System Design Report*)

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1 Introduction

Our Page Ranking Project has the basic search functionality for searching website data. Furthermore, The Page Rank Project keeps track of visited website URLs and updates that number in the database automatically when the user clicks on that website URL. Additionally, website owners can find suitable keywords and meta-description for their website. The system also has the page rank calculations feature, which is only visible to the admin.

2 User Stories

The system has two main actors: The administrator and the User. In the following set of tables, we describe in detail the user story. Each user story is attached to it a UI design for better understanding. Furthermore, the user story acceptance criteria.

Table 1: Administrator login, user story 1

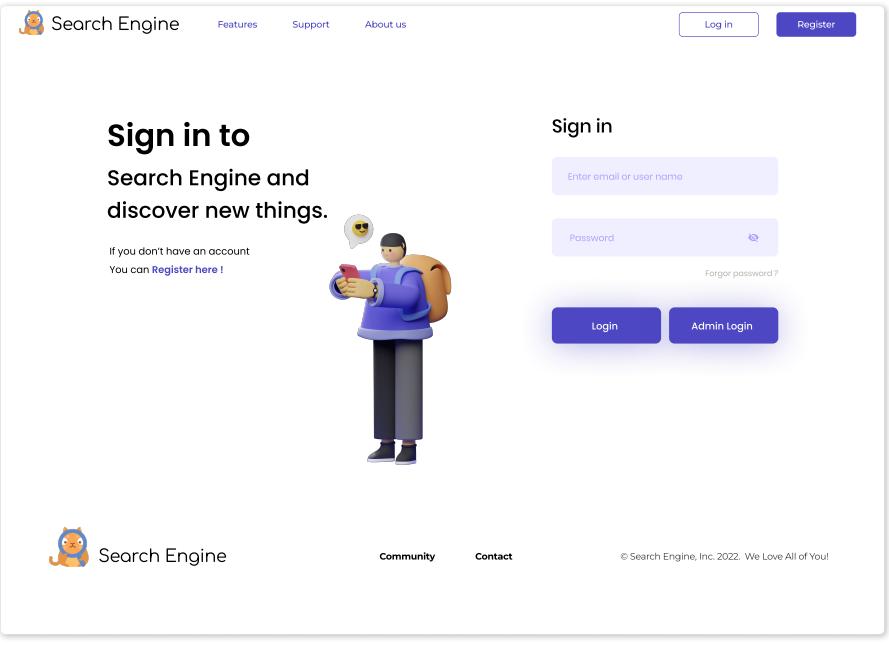
ID	US_1
Summary	Administrator login
Description	As an administrator, I want to login into the system, So that I can enter the admin area.
Priority	Highest
Story Points	3
UI/UX Attachment	
Pre Conditions	<ul style="list-style-type: none">The administrator should have the authorization credentials to enter the admin area.
Acceptance Criteria	<p>Scenario: Admin successfully login into the system.</p> <p>Given The admin navigates to the login page, When The admin enters a valid username and password And The admin clicks on the Admin Login button, Then The admin will successfully login into the system.</p>

Table 2: Feeding a new website URL to search, user story 2

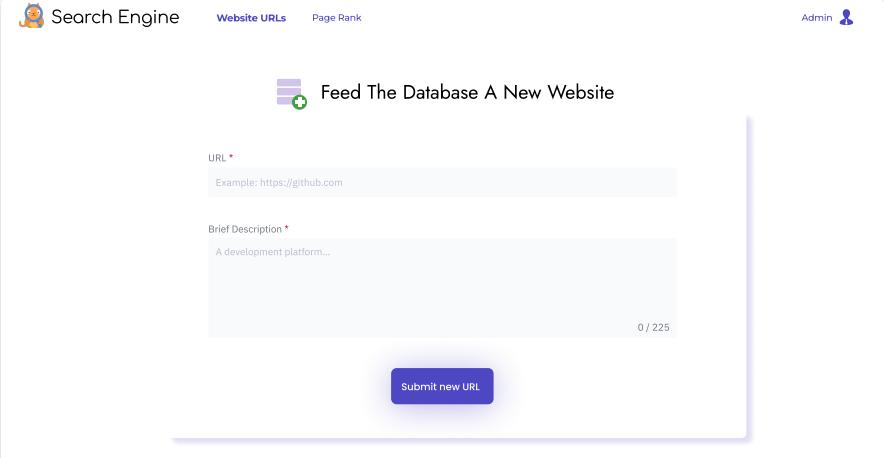
ID	US_2
Summary	Feeds website URLs
Description	As an administrator, I want to be able to feed the database website URLs and their metadata, So that the system can use them to search the user query.
Priority	Highest
Story Points	5
UI/UX Attachment	 
Pre Conditions	<ul style="list-style-type: none"> • US_1
Acceptance Criteria	<p>Scenario: Admin successfully feeds a website URL and its metadata.</p> <p>Given The admin navigates to the website URLs page, When The admin enters a valid URL and metadata And The admin clicks on submit new URL button, Then The system will add new website to the database.</p>

Table 3: Page rank calculations, user story 3

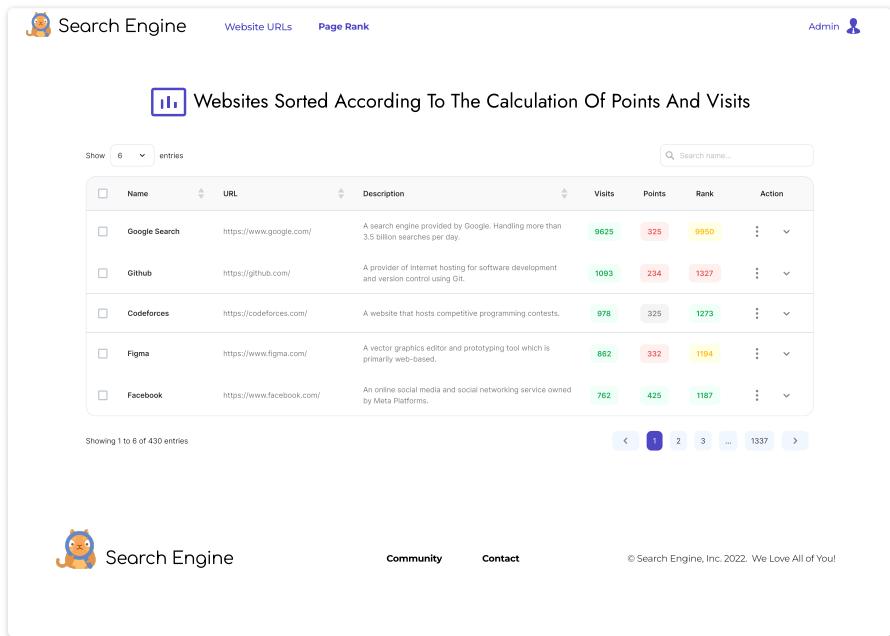
ID	US_3																																										
Summary	Page rank calculations																																										
Description	As an administrator, I want to view the page rank calculations, So that I can optimize the search functionality.																																										
Priority	High																																										
Story Points	8																																										
UI/UX Attachment	 <p>The screenshot shows a web application interface titled "Search Engine". At the top, there are tabs for "Website URLs" and "Page Rank". On the right, there is a user icon labeled "Admin". Below the tabs, the title "Websites Sorted According To The Calculation Of Points And Visits" is displayed. A table follows, showing five rows of website data:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>URL</th> <th>Description</th> <th>Visits</th> <th>Points</th> <th>Rank</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Google Search</td> <td>https://www.google.com/</td> <td>A search engine provided by Google. Handling more than 3.5 billion searches per day.</td> <td>9625</td> <td>325</td> <td>9950</td> <td>⋮ ⚏</td> </tr> <tr> <td>Github</td> <td>https://github.com/</td> <td>A provider of Internet hosting for software development and version control using Git.</td> <td>1093</td> <td>234</td> <td>1327</td> <td>⋮ ⚏</td> </tr> <tr> <td>Codeforces</td> <td>https://codeforces.com/</td> <td>A website that hosts competitive programming contests.</td> <td>978</td> <td>325</td> <td>1273</td> <td>⋮ ⚏</td> </tr> <tr> <td>Figma</td> <td>https://www.figma.com/</td> <td>A vector graphics editor and prototyping tool which is primarily web-based.</td> <td>862</td> <td>332</td> <td>1104</td> <td>⋮ ⚏</td> </tr> <tr> <td>Facebook</td> <td>https://www.facebook.com/</td> <td>An online social media and social networking service owned by Meta Platforms.</td> <td>762</td> <td>425</td> <td>1187</td> <td>⋮ ⚏</td> </tr> </tbody> </table> <p>At the bottom of the table, it says "Showing 1 to 6 of 430 entries" and has a navigation bar with pages 1, 2, 3, ..., 1337, >.</p>	Name	URL	Description	Visits	Points	Rank	Action	Google Search	https://www.google.com/	A search engine provided by Google. Handling more than 3.5 billion searches per day.	9625	325	9950	⋮ ⚏	Github	https://github.com/	A provider of Internet hosting for software development and version control using Git.	1093	234	1327	⋮ ⚏	Codeforces	https://codeforces.com/	A website that hosts competitive programming contests.	978	325	1273	⋮ ⚏	Figma	https://www.figma.com/	A vector graphics editor and prototyping tool which is primarily web-based.	862	332	1104	⋮ ⚏	Facebook	https://www.facebook.com/	An online social media and social networking service owned by Meta Platforms.	762	425	1187	⋮ ⚏
Name	URL	Description	Visits	Points	Rank	Action																																					
Google Search	https://www.google.com/	A search engine provided by Google. Handling more than 3.5 billion searches per day.	9625	325	9950	⋮ ⚏																																					
Github	https://github.com/	A provider of Internet hosting for software development and version control using Git.	1093	234	1327	⋮ ⚏																																					
Codeforces	https://codeforces.com/	A website that hosts competitive programming contests.	978	325	1273	⋮ ⚏																																					
Figma	https://www.figma.com/	A vector graphics editor and prototyping tool which is primarily web-based.	862	332	1104	⋮ ⚏																																					
Facebook	https://www.facebook.com/	An online social media and social networking service owned by Meta Platforms.	762	425	1187	⋮ ⚏																																					
Pre Conditions	<ul style="list-style-type: none"> • US_1 																																										
Acceptance Criteria	<p>Scenario: Admin will be able to display the page rank list.</p> <p>Given The admin navigates to the Page Rank page, Then The system will list out all pages sorted in descending order according to their points and visits.</p>																																										

Table 4: User registration, user story 4

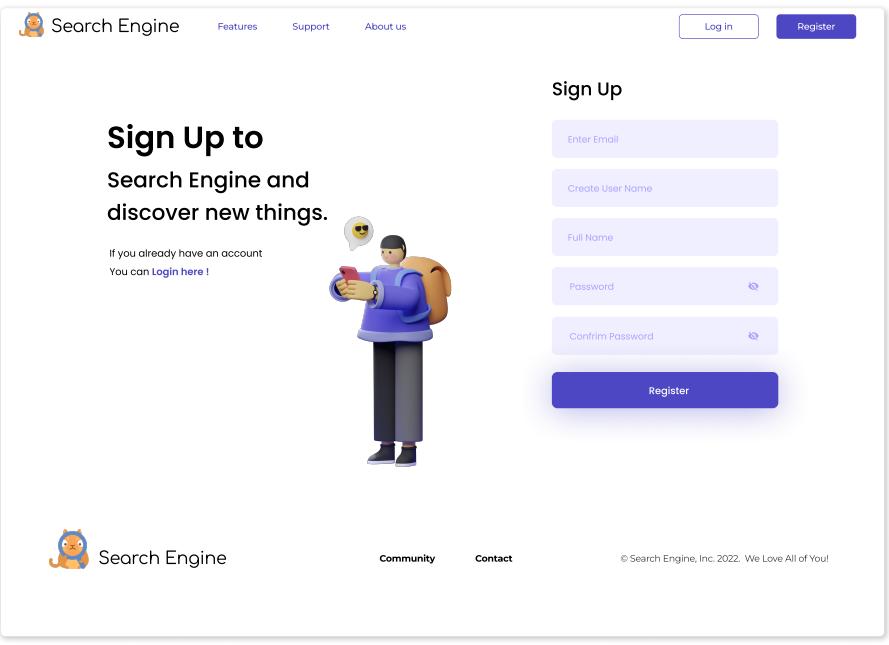
ID	US_4
Summary	User registration
Description	As a user, I want to be able to register to the system, So that I can use system functionality.
Priority	Highest
Story Points	3
UI/UX Attachment	
Pre Conditions	-
Acceptance Criteria	<p>Scenario: User successfully register to the system.</p> <p>Given The user navigates to the sign-up page, When The user enters a valid email, username, full name, password, and confirm password correctly And The user clicks on the Register button, Then The system will successfully register the user into the system.</p>

Table 5: User login, user story 5

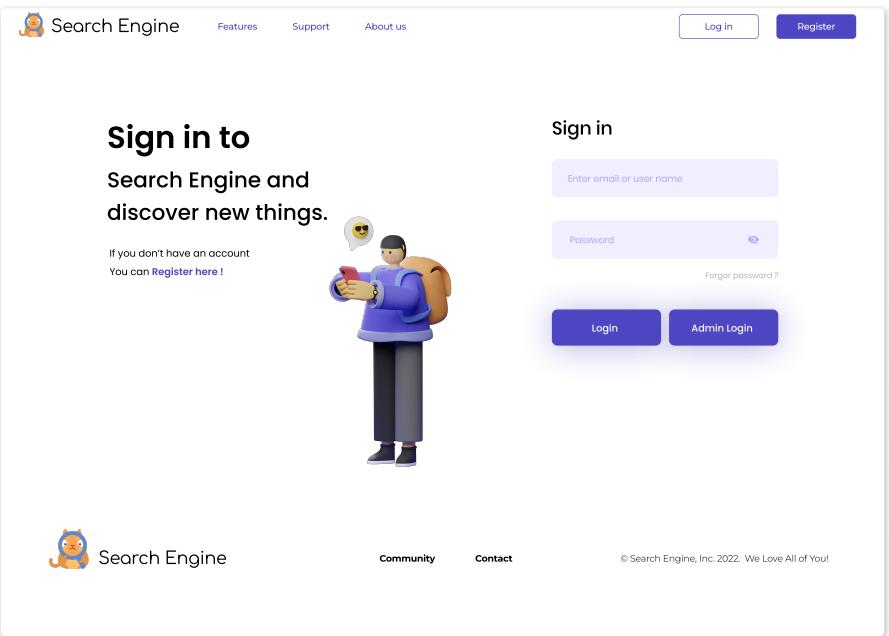
ID	US_5
Summary	User login
Description	As a user, I want to login into the system, So that I can search for specific topics and finding suitable keywords for my website.
Priority	Highest
Story Points	2
UI/UX Attachment	
Pre Conditions	<ul style="list-style-type: none"> • US_4
Acceptance Criteria	<p>Scenario: User successfully login into the system.</p> <p>Given The user navigates to the login page, When The user enters a valid username and password And The user clicks on the Login button, Then The user will successfully login into the system.</p>

Table 6: Search box, user story 6

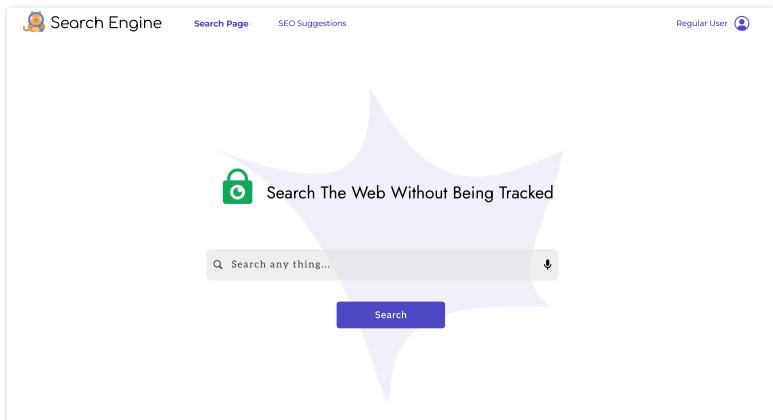
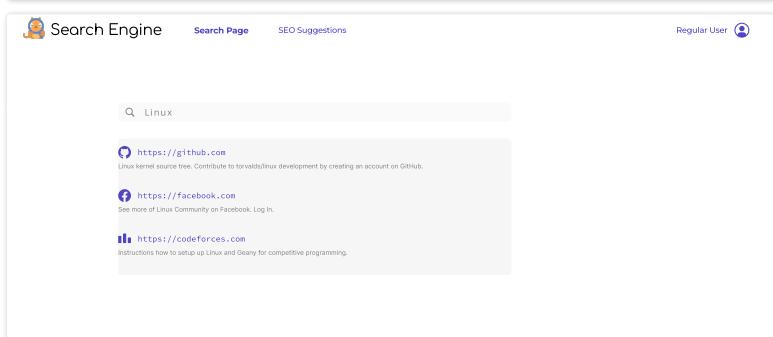
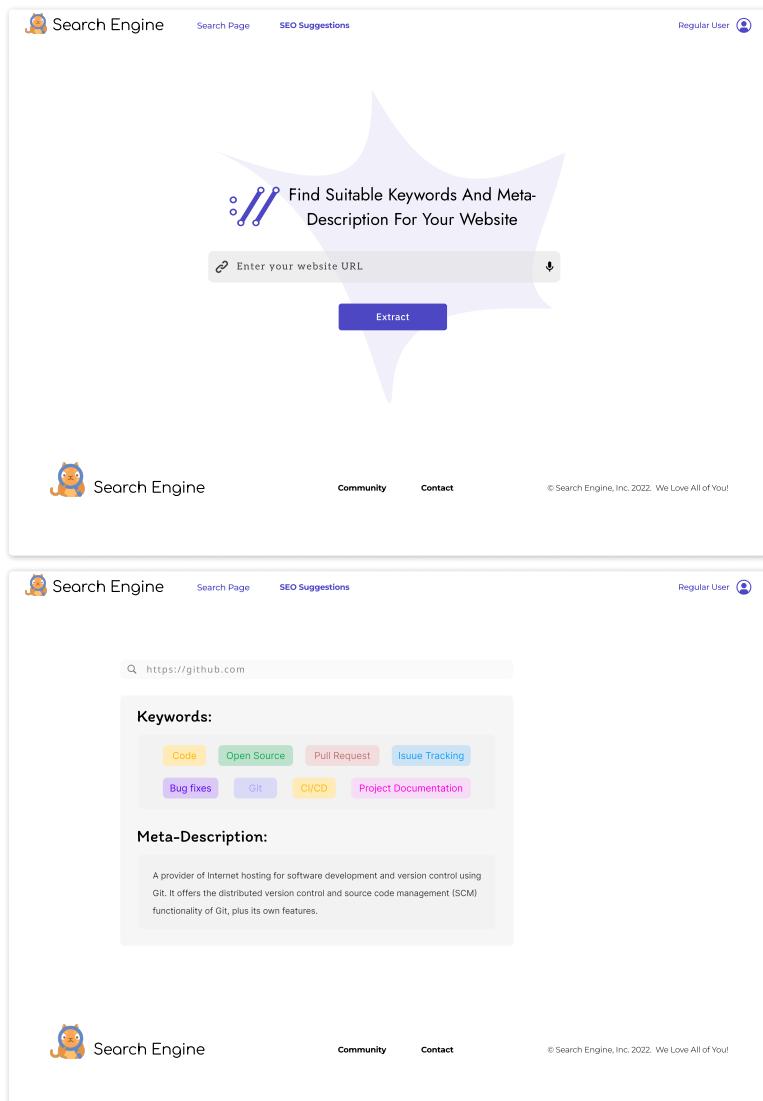
ID	US_6
Summary	Search box
Description	As a user, I want to be able to use the search box on the search page, So that I can be able to query.
Priority	Highest
Story Points	8
UI/UX Attachment	 
Pre Conditions	<ul style="list-style-type: none"> • US_5
Acceptance Criteria	<p>Scenario: User successfully using the search box.</p> <p>Given The user navigates to the search page, When The user enters a query in the search box And The user clicks on the Search button, Then The system will generate a list of website URLs related to that query.</p>

Table 7: Keywords and meta-descriptions extraction, user story 7

ID	US_7
Summary	Keywords and meta-descriptions extraction
Description	As a website owner, I want to search a live URL, So that I can get suitable keywords and meta-descriptions for my website.
Priority	Medium
Story Points	5
UI/UX Attachment	
Pre Conditions	<ul style="list-style-type: none"> • US_5
Acceptance Criteria	<p>Scenario: Website owner successfully using the live URL search box for extracting keywords.</p> <p>Given The website owner navigates to the seo suggestions page, When The website owner enters a live URL in the search box And The website owner clicks on the Extract button, Then The system will generate a list of keywords and meta-descriptions from that website's data.</p>

3 Use Cases

3.1 Use Case Diagram

The diagram below visualizes all the actors in the system and all the interactions each actor can do.

Figure 1: User case diagram



3.2 Use Case Model

This section includes the details, description, and the main success scenario of use cases in an organized way.

Table 8: Administrator login, use case 1

ID	UC_1
Title	Administrator login
Description	The administrator shall login into the system using admin credentials.
Primary Actor	Administrator
Pre-Conditions	<ul style="list-style-type: none"> • The administrator should have the authorization credentials to enter the admin area.
Post-Conditions	-
Main Success Scenario	<ol style="list-style-type: none"> 1. The administrator fills in username and password fields. 2. The administrator clicks on the admin login button. 3. The system will validate the username and password. If correct, login into the system; otherwise, stay on the current login page.

Table 9: Feed new website URL, use case 2

ID	UC_2
Title	Feed new website URL
Description	The administrator shall feed a new website URL and its metadata into the system.
Primary Actor	Administrator
Pre Conditions	<ul style="list-style-type: none"> • UC_1
Post Conditions	The system saves the data to the database.
Main Success Scenario	<ol style="list-style-type: none"> 1. The administrator feeds the database website URLs and its metadata. 2. The administrator clicks on add new website button. 3. The system saves the data in a new row in the database.

Table 10: View page rank calculations, use case 3

ID	UC_3
Title	View page rank calculations
Description	The administrator shall be able to view the page rank calculations.
Primary Actor	Administrator
Pre Conditions	<ul style="list-style-type: none"> • UC_1
Post Conditions	-
Main Success Scenario	<ol style="list-style-type: none"> 1. The administrator clicks the page ranking anchor in the tab menu. 2. The system lists the website URLs in the database sorted based on their number of visits and points.

Table 11: User registration, use case 4

ID	UC_4
Title	User registration
Description	The user shall be able to register to the system.
Primary Actor	User
Pre Conditions	-
Post Conditions	The system redirects the user to the login page.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user enters a valid email, password, username, full name, and confirm the password correctly. 2. The user clicks the Sign up button. 3. The system successfully register the user into the system.

Table 12: User login, use case 5

ID	UC_5
Title	User login
Description	The user shall be able to login into the system.
Primary Actor	User
Pre Conditions	<ul style="list-style-type: none"> • UC_4
Post Conditions	The system redirects the user to the search page.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user fills in username and password fields. 2. The user clicks on the login button. 3. The system will validate the username and password. If correct, login; otherwise, stay on the current login page.

Table 13: Search query, use case 6

ID	UC_6
Title	Search query
Description	The user shall be able to use the search functionality for searching specific terms.
Primary Actor	User
Pre Conditions	<ul style="list-style-type: none"> • UC_5
Post Conditions	The system will generate a list of related website URLs that matches the query.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user clicks the search page anchor in the tab menu. 2. The system opens the page of the search. 3. The user write down his/her search query in the search box. 4. The user clicks the search button. 5. The system uses this query and matches it with the content provided in URLs fed in the database. 6. The system generates a list of related URLs. 7. The user can then click on any URL in the generated list, and the URL will open the corresponding website. 8. The system increases the number of visits to that URL in the database. 9. The system goes to the web page URL to fetch its metadata and gives points according to page errors. 10. The system updates the page's rank in the database according to the points the page gains and the number of visits.

Table 14: Extract keywords and meta-descriptions, use case 7

ID	UC_7
Title	Extract keywords and meta-descriptions
Description	The website owner shall be able to use the SEO suggestion to find suitable keywords and meta-descriptions for their website.
Primary Actor	User
Pre Conditions	<ul style="list-style-type: none"> • UC_5
Post Conditions	The system will extract a list of keywords and meta-descriptions from that particular URL.
Main Success Scenario	<ol style="list-style-type: none"> 1. The user write down a live URL in the search box. 2. The user clicks the find keywords and meta-description button. 3. The system goes and scans the web page URL, extracts its meta-features. 4. The system then lists out suitable keywords related to the contents of the web page URL and a meta-description.

4 Sequence Diagram

The sequence diagrams below show the interactions between the system with each other.

Figure 2: Administrator login, sequence diagram 1

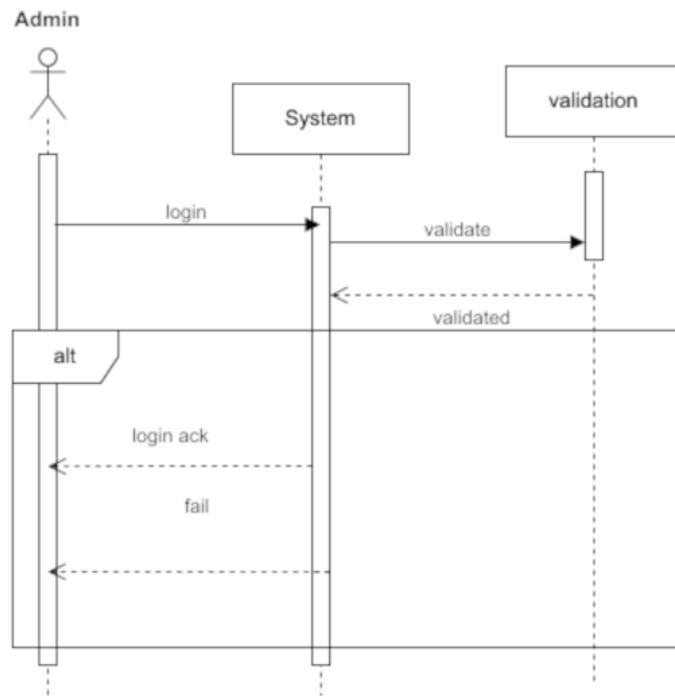


Figure 3: Feeds new website URL, sequence diagram 2

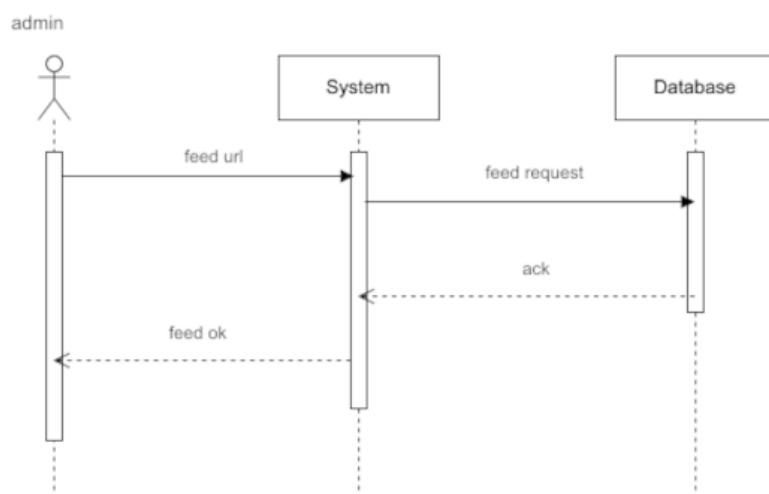


Figure 4: Search query, sequence diagram 3

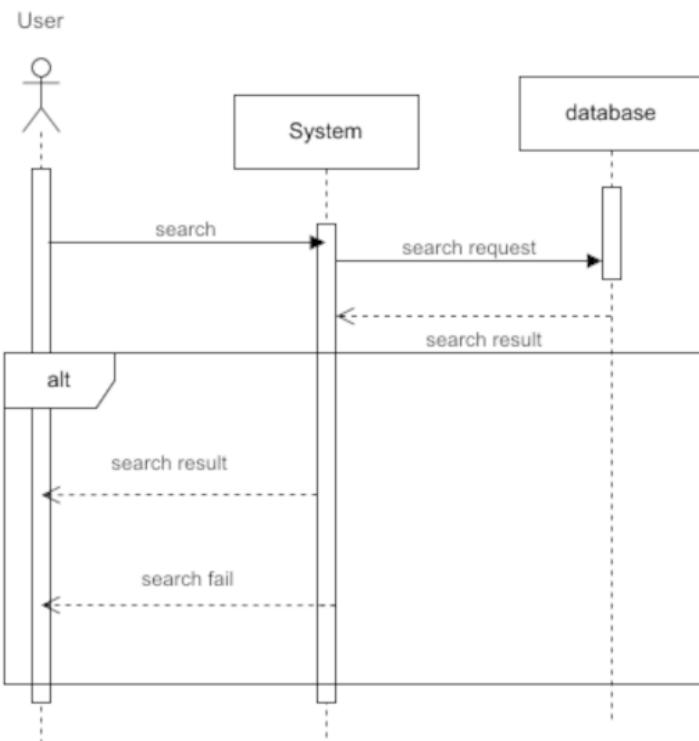


Figure 5: Clicks URL, sequence diagram 4

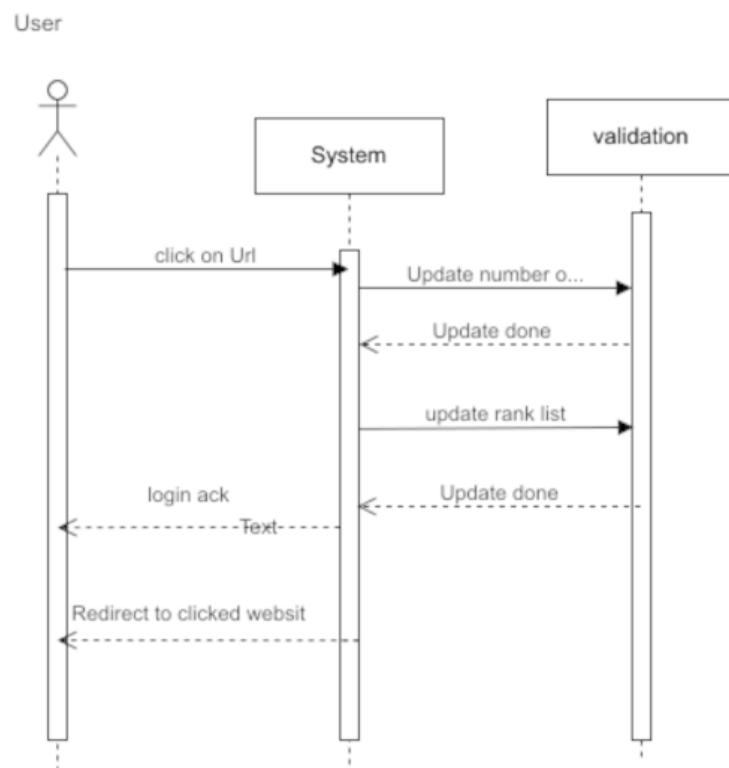
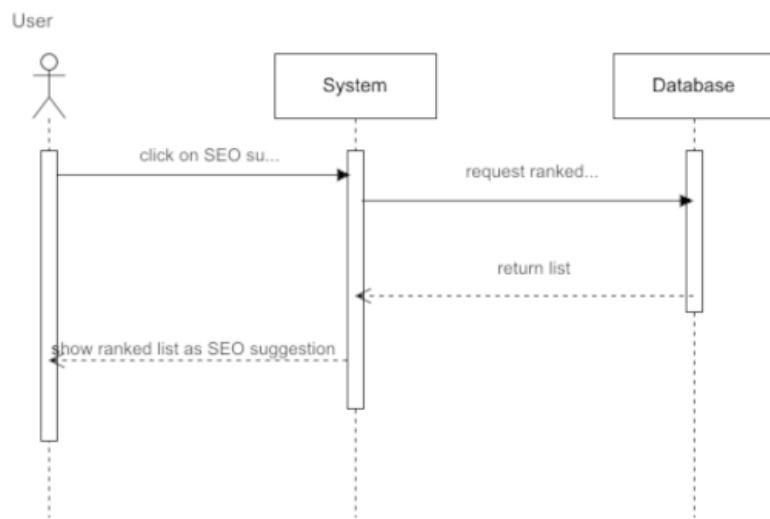


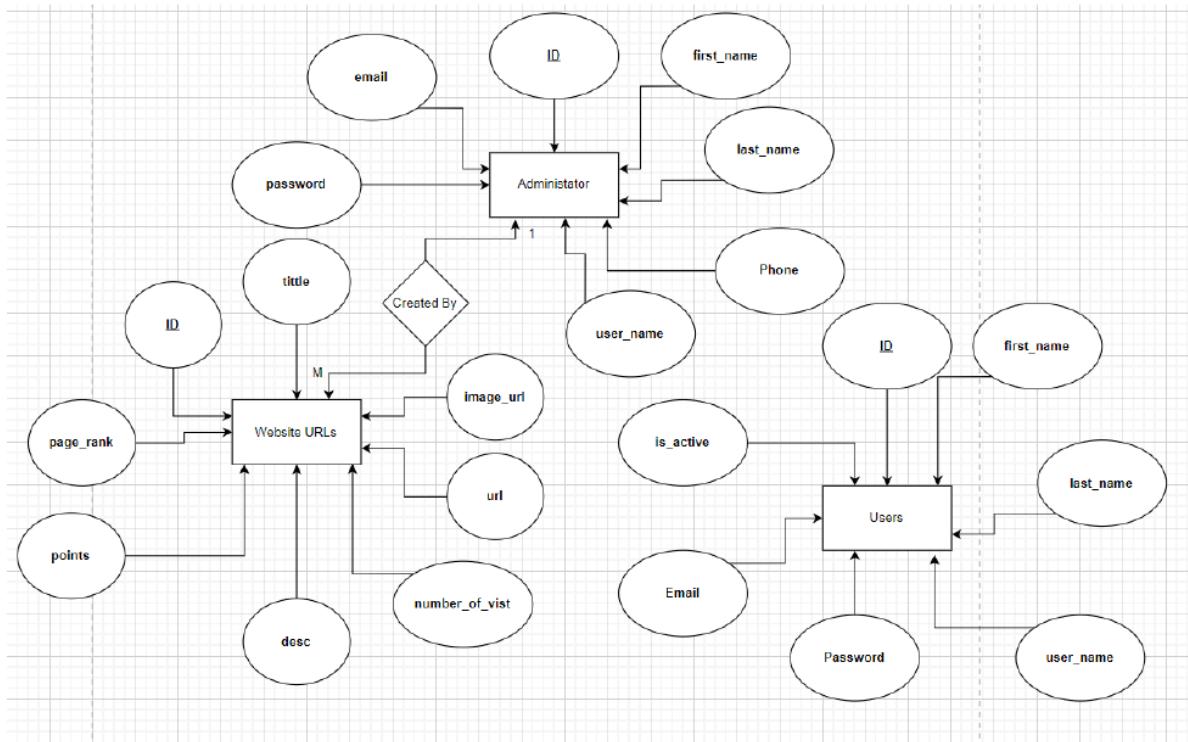
Figure 6: SEO Suggestions, sequence diagram 5



5 Entity Relationship Diagram

The following diagram below shows the relationship between the system entities.

Figure 7: Entity relationship diagram



6 Test Scripts

Below are the test scripts for checking if the application acts as expected.

Table 15: Check admin login with valid credentials, test case 1

ID	TC_1
Description	Check Admin login with valid credentials
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/login 2. Enter Username 3. Enter Password 4. Click Admin Login
Test Data	<ul style="list-style-type: none"> • Username: abdurrahman • Password: Hoi34m4nj3j
Expected Results	Admin should Login into the system.
Actual Results	As expected
Status	Passed

Table 16: Check user login with valid credentials, test case 2

ID	TC_2
Description	Check user login with valid credentials
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/login 2. Enter Username 3. Enter Password 4. Click Login
Test Data	<ul style="list-style-type: none"> • Username: omar_yousuf • Password: omar123457
Expected Results	User should Login into the system.
Actual Results	As expected
Status	Passed

Table 17: Check user registration with valid credentials, test case 3

ID	TC_3
Description	Check user registration with valid credentials
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/signup 2. Enter Email 3. Enter Username 4. Enter Full Name 5. Enter Password 6. Confirm Password 7. Click Sign up
Test Data	<ul style="list-style-type: none"> • Email: omar_ahmad@gmail.com • Username: omar_ahmad • Full Name: Omar Ahmad Allam • Password: omar2022
Expected Results	User should be able to register to the system.
Actual Results	As expected
Status	Passed

Table 18: Check search functionality, test case 4

ID	TC_4
Description	Check search functionality
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/search 2. write term in the search box 3. Click Search
Test Data	<ul style="list-style-type: none"> • term: Linux
Expected Results	The system should list three URLs, GitHub, Facebook, and CodeForces.
Actual Results	As expected
Status	Passed

Table 19: Check feed new website functionality, test case 5

ID	TC_5
Description	Check feed new website functionality
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/feed-new-website 2. write the website URL 3. Write the meta-descriptions for the website 4. Click add new URL
Test Data	<ul style="list-style-type: none"> • URL:https://github.com • meta-descriptions: GitHub is a provider of Internet hosting for software development and version control using Git
Expected Results	The system should respond with a notification, "Added new website to the database."
Actual Results	As expected
Status	Passed

Table 20: Check page rank calculations, test case 6

ID	TC_6
Description	Check page rank calculations
Priority	High
Test Steps	<ol style="list-style-type: none"> 1. Go to https://search-engine.org/pagerank
Test Data	-
Expected Results	The system should list all websites in ascending order according to their points and number of visits.
Actual Results	As expected
Status	Passed