



Website for the Heavy Machinery Industry

Course: CS 390

Team #: 6

Team Members: Brad, Tyler



Customer Requirements: System's Need and Feasibility

Why does somebody need this system?

- Websites allow customers, employees, and investors to interact with the company and gain information in ways that are impossible offline
 - View, sort, and compare all of the company's products in one place
 - Request quotes or further information with no hassle
 - Stay up to date on all news published about the company

What are the advantages of our new system?

- Our system offers two new functions not found on any of the competitors websites
 - Price comparison against competing products
 - Details about current projects involving our company

Customer Requirements: System's Scope

- Primary users are those involved in other companies that are planning construction projects
- Estimated 500,000 users per month
- Globally available to anyone with access to the Internet





Customer Requirements: Functionality

Main Functions:

1. Login & Logout
2. Registration (Customers & Employees)
3. View Parts & Equipment
4. Compare Parts & Equipment
5. Order Parts & Equipment
6. View Competitor Prices
7. Calculate Price Differences
8. Search Website
9. Contact Employees
10. Find a Dealer or Distributor
11. View Current Job Openings
12. Apply for Jobs
13. View Media
14. Add / Remove Projects
15. Share to Social Media



Customer Requirements: Technical Platform & Environment

Access to the Internet is **REQUIRED** to use this system

Supported Platforms:

- Windows PC (Windows 7, Windows 8, Windows 8.1, Windows 10 or later)
 - Most recent version of Google Chrome, Firefox, or Microsoft Edge
- Mac (OS X Yosemite 10.10 or later)
 - Most recent version of Safari, Opera, Google Chrome, or Firefox
- Linux (64-bit Ubuntu 14.04+ or equivalent)
 - Most recent version of Google Chrome, Chromium, Opera, or Firefox



Customer Requirements: Possible Main Constraints

Technology

- The system must conform to current standard computer and Internet protocols

Cost

- Total Cost of System: \$377,000
- Employee Salaries
- Database Initial and Monthly Fees
- Equipment Costs

Time

- The system must be fully completed, tested, and optimized within 18 months of initiation to remain relevant

People

- The system requires knowledgeable employees to be built and maintained



Customer Requirements: Similar Websites

1. <http://www.caterpillar.com/>
2. <https://www.komatsuamerica.com/>
3. <https://www.volvoce.com/>
4. <https://www.hitachicm.com/>
5. <https://www.liebherr.com/en/deu/start/start-page.html>
6. <http://www.sanyglobal.com/>
7. <https://www.terex.com/>
8. <http://www.doosaninfracore.com/en/>
9. <https://www.deere.com/en/>

Analysis Phase: Heavy Machinery Company Websites

- Caterpillar
- Komatsu
- Volvo Construction Equipment
- Hitachi Construction Equipment
- Liebherr
- Sany
- Zoomlion
- Terex
- Doosan Infracore
- John Deere

Source:

<https://constructionreviewonline.com/2017/04/topconstruction-equipment-manufacturers/>

Main Identified 20 Class Objects

1. Customers
2. Equipment
3. Company
4. Investors
5. Employees
6. Dealers
7. Departments
8. Careers
9. News
10. Search box
11. Contacts
12. Site map
13. Projects
14. Finances
15. Images
16. System Admin
17. Stock Info
18. Social media
19. Locations
20. Database

Main Identified 20 Functions:

1. Search website
2. View equipment specifications
3. Compare equipment
4. Contact dealers
5. Search locations
6. Search & apply
7. Schedule visits
8. View news updates
9. Purchase stocks
10. Get email alerts
11. Contact shareholder service
12. View financial information
13. Request materials
14. Share to social media
15. Search for parts
16. Listen to webcast
17. Read jobsite stories
18. Get support
19. Visit forums
20. Change search location

#1: Caterpillar



Source: <https://www.caterpillar.com/>

Main Identified 20 Class Objects

1. Customers
2. Equipment
3. Company
4. Employees
5. System Admin
6. Parts
7. Service and support
8. Financing
9. Recent blogs
10. My Komatsu
11. Search box
12. Careers
13. Contacts
14. News and press
15. Images
16. Locations
17. Site map
18. Social media
19. Videos
20. Database

Main Identified 20 Functions:

1. Search website
2. Search locations
3. Search equipment
4. View menu
5. Locate a distributor
6. Compare equipment
7. Request a quote
8. Manage your account
9. View customer stories
10. View press releases
11. Search jobs
12. Search for parts
13. Order parts
14. Schedule visit
15. Watch videos
16. Apply for lease
17. Renew lease
18. Convert to purchase
19. Return equipment
20. Share to social media

#2: Komatsu

The image shows the official website for Komatsu America. At the top, there's a navigation bar with links for EQUIPMENT, SMART CONSTRUCTION, PARTS, SERVICE AND SUPPORT, and FINANCING. Below the header, a large banner features the text "TECHNOLOGY SOLUTIONS EXPERT" and a call-to-action button labeled "LEARN MORE >". The background of the banner shows a person's arm and shoulder. At the bottom of the page, there are four icons representing different types of construction equipment: EXCAVATORS, DOZERS, WHEEL LOADERS, and TRUCKS.

Source: <https://www.komatsuamerica.com/>

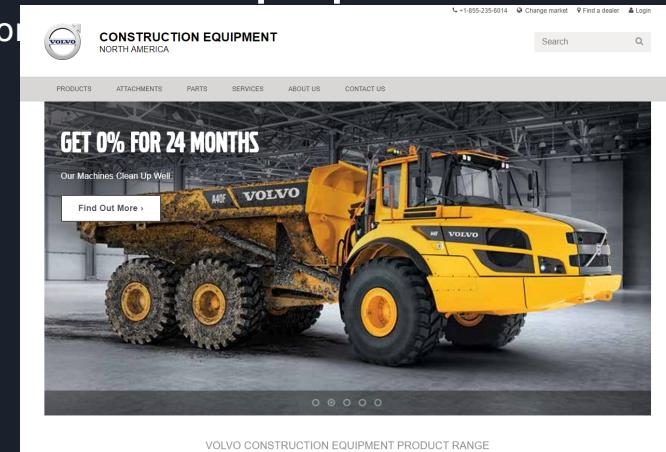
Main Identified 20 Class Objects

1. Customers
2. Equipment
3. Company
4. Employees
5. Attachments
6. Parts
7. Services
8. About us
9. Contacts
10. News
11. Social media
12. Careers
13. Search box
14. Site map
15. Locations
16. Videos
17. Images
18. System Admin
19. Events
20. Database

Main Identified 20 Functions:

1. Search website
2. Change market
3. Find a dealer
4. Login
5. Request machine information
6. Download brochures
7. Contact us
8. Search attachments
9. Order attachments
10. Make a request
11. Logout
12. Refine news stories
13. View news stories
14. View customer stories
15. Apply now
16. Register Customers
17. Register for events
18. Watch videos
19. View images
20. Share to social media

#3: Volvo Construction Equipment



Source:

<https://www.volvoce.com/united-states/en-us/>

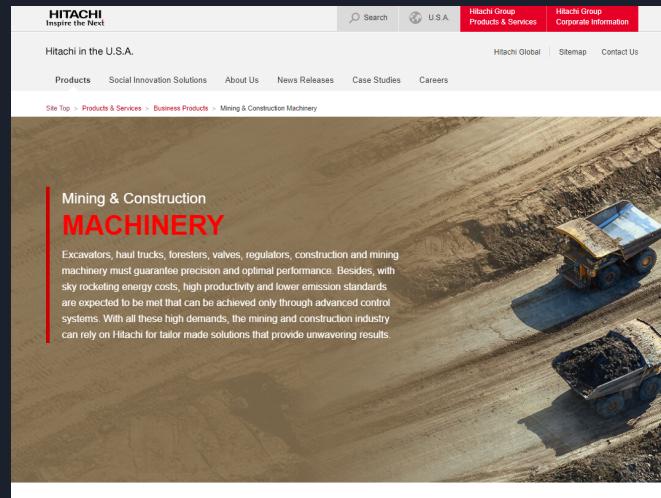
Main Identified 20 Class Objects:

1. Customers
2. Equipment
3. Company
4. Employees
5. Sitemap
6. Search box
7. Contacts
8. Mining
9. Construction Machinery
10. Case studies
11. Careers
12. News
13. Social Media
14. Videos
15. Directory
16. Government Relations
17. Images
18. Products
19. Database
20. System administrator

Main Identified 20 Functions:

1. Search website
2. Change location
3. Choose language
4. Contact us
5. Locate a dealer
6. View product information
7. Compare equipment
8. Download brochures
9. Purchase products
10. View company job directory
11. Apply for jobs
12. Watch event live streams
13. View news stories
14. View case studies
15. Send inquiry forms
16. Login
17. Logout
18. View images

#4: Hitachi Construction Equipment



Source:

<http://www.hitachi.us/>

Main Identified 20 Class Objects

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Products
8. Careers
9. News
10. Social Media
11. Contacts
12. History
13. Site Map
14. Locations
15. Departments
16. Search Box
17. Annual reports
18. Services
19. Shop
20. Images

Main Identified 20 Functions:

1. Print Page
2. Go To Top of Page
3. Change Location
4. Choose Language
5. Add Equipment
6. Remove Equipment
7. Compare Equipment
8. View Product Information
9. Download Brochures
10. Rent Machine
11. Find Used Machines
12. Register Customers
13. Login
14. Logout
15. Watch Videos
16. Find Contact Persons
17. Search Company Jobs
Directory
18. Apply For Jobs
19. Request Services
20. Share To Social Media

#5: Liebherr

The screenshot shows a dark-themed website for Liebherr. At the top, there's a navigation bar with links for 'History' (highlighted in yellow), 'About Liebherr', 'Products', 'News', and 'Career'. Below the navigation, a breadcrumb trail shows 'Home > Products > Construction machines'. The main content area is titled 'Construction machines' and contains a paragraph about the company's extensive range of construction equipment.

Construction machines

The extensiveness of Liebherr's construction machines program is like no other. Apart from tower cranes of every kind and size and mobile construction cranes, the program includes a broad range of earth moving equipment with hydraulic excavators, wheel loaders, crawler tractors and crawler loaders, telescopic handlers and dumper trucks. For special underground engineering projects, we supply universal duty cycle crawler cranes or special piling and drilling rigs. Our concreting technology opens up a whole range of solutions for the cost-effective production and optimum transportation of quality concrete.

Source:

<https://www.liebherr.com/en/usa/products/construction-machines/construction-machines.html>

Main Identified 20 Class Objects:

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Products
8. News
9. Support
10. Service
11. Contacts
12. Inquiry
13. Financing
14. Training
15. Service Network
16. Technologies
17. Images
18. Search box
19. Site Map
20. Locations

Main Identified 20 Functions:

1. Search website
2. Change location
3. Choose language
4. Contact us
5. View product information
6. Add equipment
7. Remove equipment
8. Compare equipment
9. Download brochures
10. Send equipment inquiry
11. Request quote
12. View news stories
13. View customer stories
14. View construction cases
15. Send inquiry forms
16. Login
17. Logout
18. View images
19. Watch videos
20. Share to social media

#6:
Sany



Source: <https://www.sanyglobal.com/>

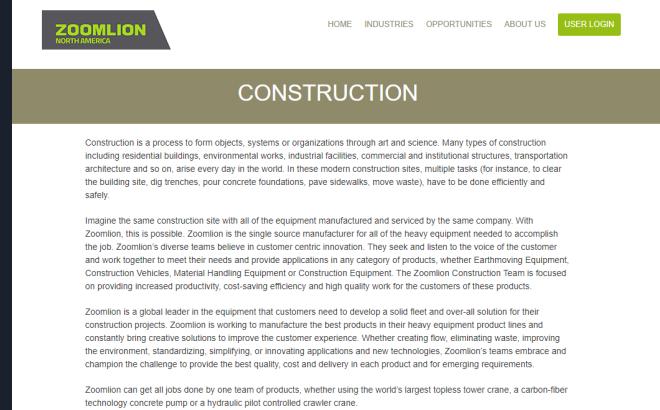
Main Identified 20 Class Objects

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Industries
8. Opportunities
9. Careers
10. Contacts
11. Benefits
12. History
13. Agriculture
14. Finance
15. Construction
16. Transportation
17. Municipal
18. Testimonials
19. Address
20. Images

Main Identified 20 Functions:

1. Login
2. Logout
3. Register Customers
4. Remove Customers
5. Register Employees
6. Remove Employees
7. Apply for Jobs
8. View Current Job Openings
9. Contact Company
- Departments
10. Edit Pages
11. Display Pages
12. View Pages
13. Add Images
14. Display Images
15. View Images
16. Download Images
17. Add Phone Numbers
18. Edit Phone Numbers
19. Add Addresses
20. Edit Addresses

#7: Zoomlion



The screenshot shows the Zoomlion North America website. At the top, there's a navigation bar with links for HOME, INDUSTRIES, OPPORTUNITIES, ABOUT US, and USER LOGIN. Below the navigation is a large banner with the word "CONSTRUCTION" in white. To the left of the banner is the Zoomlion logo. The main content area below the banner contains text about construction processes and safety, followed by a paragraph about Zoomlion's role in construction, and finally a note about their global reach and product range.

**ZOOMLION
NORTH AMERICA**

HOME INDUSTRIES OPPORTUNITIES ABOUT US USER LOGIN

CONSTRUCTION

Construction is a process to form objects, systems or organizations through art and science. Many types of construction including residential buildings, environmental works, industrial facilities, commercial and institutional structures, transportation architecture and so on, arise every day in the world. In these modern construction sites, multiple tasks (for instance, to clear the building site, dig trenches, pour concrete foundations, pave sidewalks, move waste), have to be done efficiently and safely.

Imagine the same construction site with all of the equipment manufactured and serviced by the same company. With Zoomlion, this is possible. Zoomlion is the single source manufacturer for all of the heavy equipment needed to accomplish the job. Zoomlion's diverse team believe in customer centric innovation. They seek and listen to the voice of the customer and work together to meet their needs and provide applications in any category of products, whether Earthmoving Equipment, Construction Vehicles, Material Handling Equipment or Construction Equipment. The Zoomlion Construction Team is focused on providing increased productivity, cost-saving efficiency and high quality work for the customers of these products.

Zoomlion is a global leader in the equipment that customers need to develop a solid fleet and over-all solution for their construction projects. Zoomlion is working to manufacture the best products in their heavy equipment product lines and constantly bring creative solutions to improve the customer experience. Whether creating flow, eliminating waste, improving the environment, standardizing, simplifying, or innovating applications and new technologies, Zoomlion's teams embrace and champion the challenge to provide the best quality, cost and delivery in each product and for emerging requirements.

Zoomlion can get all jobs done by one team of products, whether using the world's largest topless tower crane, a carbon-fiber technology concrete pump or a hydraulic pilot controlled crawler crane.

Source: <https://zoomlion-na.com/>

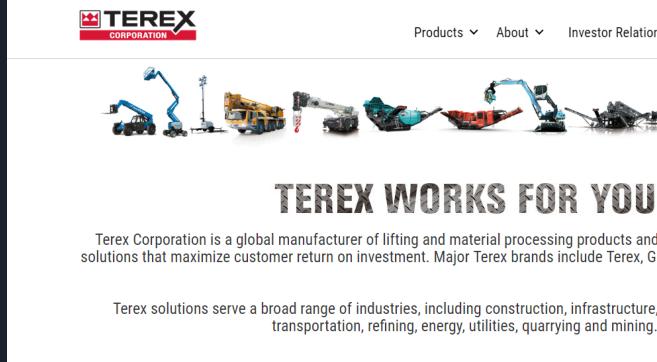
Main Identified 20 Class Objects

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Images
8. Search Box
9. Locations
10. Investors
11. Careers
12. Parts
13. Contacts
14. Social Media
15. Sitemap
16. Cranes
17. Utilities
18. Port Solutions
19. News
20. Suppliers

Main Identified 20 Functions:

1. Login
2. Logout
3. Choose Language
4. Register Customer
5. Register Employees
6. Search Website
7. Add Equipment
8. Remove Equipment
9. Get a Quote
10. Search for Parts
11. Order Parts
12. Find a Dealer
13. Download Brochures
14. Request Special Equipment
15. Search Used Equipment Inventory
16. Request Tech Support
17. Request Financial Services
18. View News Stories
19. Search Positions by Location
20. Share to Social Media

#8: Terex



The image shows the official website of Terex Corporation. At the top left is the Terex logo. To its right are three dropdown menus: "Products", "About", and "Investor Relations". Below the header is a horizontal banner displaying several pieces of heavy machinery, including excavators, cranes, and trucks. Underneath the banner, the slogan "TEREX WORKS FOR YOU" is prominently displayed in large, bold, capital letters. A descriptive paragraph follows, stating: "Terex Corporation is a global manufacturer of lifting and material processing products and solutions that maximize customer return on investment. Major Terex brands include Terex, Ge...". At the bottom of the page, a smaller text block reads: "Terex solutions serve a broad range of industries, including construction, infrastructure, transportation, refining, energy, utilities, quarrying and mining."

Source:

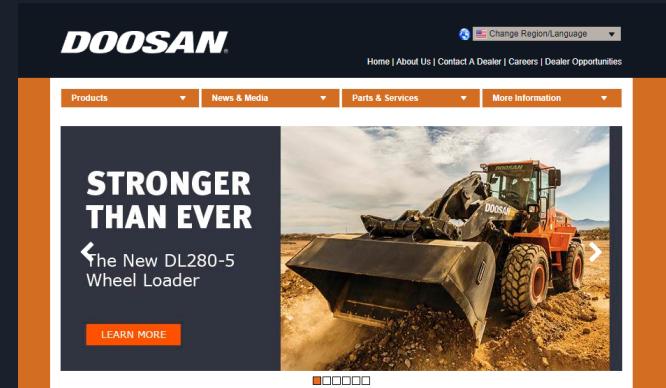
<https://www.terex.com/en>

Main Identified 20 Class Objects

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Images
8. Careers
9. Contacts
10. News
11. Parts
12. Sitemap
13. Videos
14. Social Media
15. Excavators
16. Handlers
17. Attachments
18. Dump Trucks
19. Log Loaders
20. Locations

1. Login
2. Logout
3. Register Customers
4. Change Region
5. Choose Language
6. Find a Dealer
7. Request A Demo
8. Request A Brochure
9. Download Brochures
10. Email Sign Up
11. Request Product Info
12. Add Equipment
13. Remove Equipment
14. View Equipment Specifications
15. Print Specifications
16. Compare Equipment
17. Register Employees
18. Add Images
19. Remove Images
20. Share to Social Media

#9: Doosan Infracore



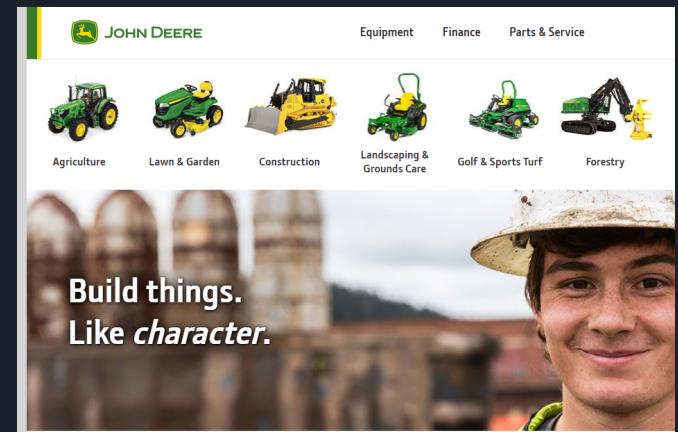
Source:
<http://www.doosanequipment.com/dice/index.page?>

Main Identified 20 Class Objects: Main Identified 20 Functions:

1. Database
2. System Administrator
3. Customers
4. Equipment
5. Company
6. Employees
7. Images
8. Search Box
9. Site map
10. Social Media
11. Products
12. Publications
13. Finance
14. Parts
15. Locations
16. News
17. Investors
18. Agriculture
19. Construction
20. Forestry

1. Login
2. Logout
3. Register Customers
4. Register Employees
5. Search Website
6. Buy Online
7. Build Your Own
8. Order Parts
9. Add Equipment
10. Find Manuals
11. Add Images
12. Remove Images
13. Search Site Map
14. Add News
15. View News
16. View Equipment
17. Add Parts
18. View Parts
19. Add Locations
20. Share to Social Media

#10: John Deere



Source: <https://www.deere.com/en/index.html>

Full Analysis Phase: Identified Common COs and proposed COs

Analysis Phase: Identified Common COs and proposed COs Part 1

Class Objects used in top 10 companies	Caterpillar	Komatsu	Volvo	Hitachi	Liebherr	Sany	Zoomlion	Terex	Doosan	John Deere	Frequency of CO in top 10 companies
Customers	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Equipment	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Company	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Employees	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Investors	+								+		3/10 (30%)
Dealers	+										1/10 (10%)
Departments	+					+					2/10 (10%)
Careers	+	+	+	+	+		+	+	+		8/10 (80%)
Search Box	+	+	+	+	+	+		+			8/10 (80%)
Site Map	+	+	+	+	+	+		+	+		9/10 (90%)
Contacts	+	+	+	+	+	+	+	+	+		9/10 (90%)
Projects	+										1/10 (10%)
Finance	+						+				3/10 (30%)
Images	+	+	+	+	+	+	+	+	+		10/10 (100%)
Stock Info	+										1/10 (10%)
Events					+						1/10 (10%)
Social Media	+	+	+	+	+			+	+		8/10 (80%)
Locations	+	+	+		+	+		+	+		8/10 (80%)
Governance					+						1/10 (10%)
Parts		+	+					+	+		5/10 (50%)
Services	+	+				+	+				4/10 (40%)
Blogs			+								1/10 (10%)
News	+	+	+	+	+	+					9/10 (90%)
Videos		+	+	+							4/10 (40%)
Attachments					+						2/10 (20%)
About Us											1/10 (10%)
Construction						+					3/10 (30%)
Mining							+				1/10 (10%)
Case Studies											1/10 (10%)
Directory											1/10 (10%)
Database	+	+	+	+	+	+	+	+	+		10/10 (100%)
System Admin	+	+	+	+	+	+	+	+	+		10/10 (100%)
Products					+	+	+				4/10 (40%)
History						+		+			2/10 (20%)

Analysis Phase: Identified Common COs and proposed COs Part 2

History		+		+			2/10 (20%)
Annual Reports			+				1/10 (10%)
Shop		+					1/10 (10%)
Technologies				+			1/10 (10%)
Training					+		1/10 (10%)
Inquiry					+		2/10 (20%)
Benefits						+	1/10 (10%)
Agriculture						+	2/10 (20%)
Transportation							1/10 (10%)
Municipal							1/10 (10%)
Testimonials							1/10 (10%)
Suppliers						+	1/10 (10%)
Utilities						+	1/10 (10%)
Excavators						+	1/10 (10%)
Handlers						+	1/10 (10%)
Dump Trucks						+	1/10 (10%)
Log Loaders						+	1/10 (10%)
Publications							1/10 (10%)
Forestry							1/10 (10%)
Proposed: Competitor Price Comparisons						+	0/10 (0%)
Proposed: Current Projects						+	0/10 (0%)



A list of COs to be included in our new system and 2 new proposed COs:

1. Customers
2. Equipment
3. Company
4. Employees
5. Images
6. Database
7. System Administrator
8. News
9. Site Map
10. Contacts
11. Careers
12. Social Media
13. Locations
14. Parts
15. Services
16. Videos
17. Products
18. Departments
19. Quotes
20. Investors
21. NEW Proposed CO: Competitor Prices
22. NEW Proposed CO: Current Projects

Full Analysis Phase: Identified Common Functions²³ and Proposed Functions

Analysis Phase: Identified Common Functions and Proposed Functions Part 1

Functions used in top 10 companies	Caterpillar	Komatsu	Volvo	Hitachi	Liebherr	Sany	Zoomlion	Terex	Doosan	John Deere	Frequency of functions in top 10 companies
Search Website	+	+	+	+	+	+		+		+	8/10 (80%)
View Equipment	+			+						+	3/10 (30%)
Compare Equipment	+	+		+	+	+			+		6/10 (60%)
Contact Dealers	+										1/10 (10%)
Schedule Visits	+	+									2/10 (20%)
View news updates	+		+	+				+		+	5/10 (50%)
Purchase Stocks	+										1/10 (10%)
Get Email Alerts	+										1/10 (10%)
Contact Shareholder Services	+										1/10 (10%)
View Financial Information	+										1/10 (10%)
Request Materials	+										1/10 (10%)
Share to Social Media	+	+	+	+	+	+		+	+	+	9/10 (90%)
Search for Parts	+	+								+	3/10 (30%)
Listen to Webcast	+										1/10 (10%)
Read Jobsite Stories	+										1/10 (10%)
Get Support	+										1/10 (10%)
Visit Forums	+										1/10 (10%)
Change Search Location	+	+	+	+	+	+		+	+		8/10 (80%)
Search Materials	+										1/10 (10%)
View Menu	+										1/10 (10%)
Request a Quote	+							+			2/10 (20%)
Manage your Account	+										1/10 (10%)
View Customer Stories	+		+								2/10 (20%)
View Press Releases	+										1/10 (10%)
Search Jobs	+					+					2/10 (20%)
Order Parts	+			+							3/10 (30%)
Watch Videos	+	+			+	+					4/10 (40%)
Apply for Lease	+										1/10 (10%)
Renew Lease	+										1/10 (10%)
Return Equipment	+										1/10 (10%)
Login	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Logout	+	+	+	+	+	+	+	+	+	+	10/10 (100%)
Contact Us	+		+				+				3/10 (30%)
Search Attachments											1/10 (10%)
Order Attachments											1/10 (10%)
Make a Request											1/10 (10%)
Refine News Stories											2/10 (20%)
Apply For Job		+	+	+	+		+				4/10 (40%)
Register Customers		+			+		+	+	+	+	6/10 (60%)

Analysis Phase: Identified Common Functions and Proposed Functions Part 2



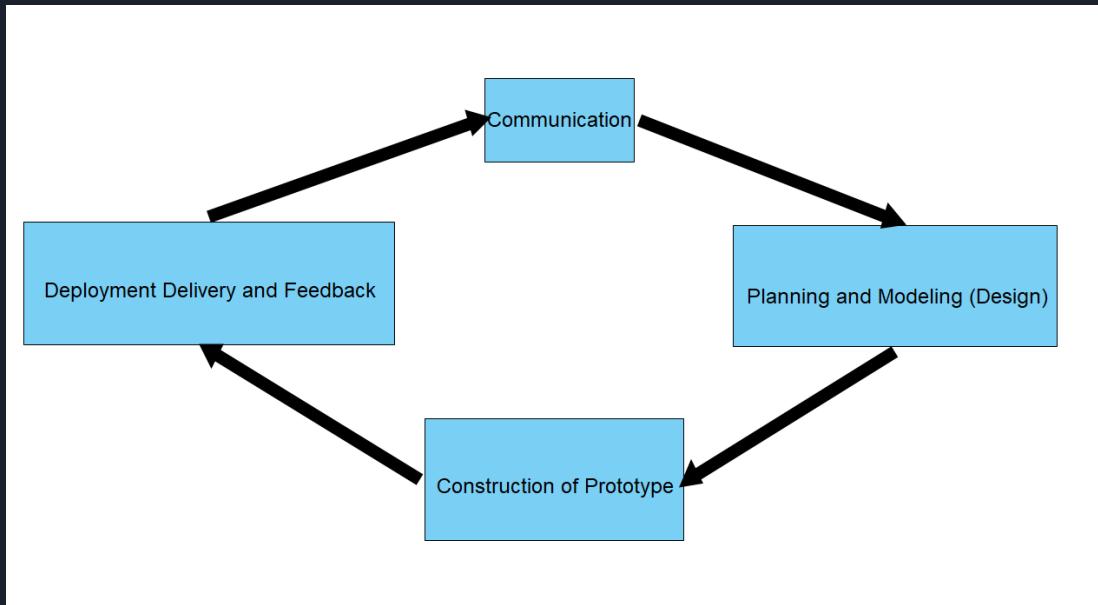
A list of Functions to be included in our new system including 5 new proposed Functions:

1. Login
2. Logout
3. Share to Social Media
4. Search Website
5. Change Search Location
6. Compare Equipment
7. Remove Employees
8. View Images
9. View News Update
10. Watch Videos
11. Apply For Job
12. Add Equipment
13. Remove Equipment
14. Register Employees
15. Register Customers
16. Remove Customers
17. View Equipment
18. Order Parts
19. Contact Employees
20. Choose Language
21. NEW Proposed Function: View Competitor Prices
22. NEW Proposed Function: Calculate Price Differences
23. NEW Proposed Function: View Current Projects
24. NEW Proposed Function: Add Project
25. NEW Proposed Function: Remove Project

Software Engineering Process Model

27

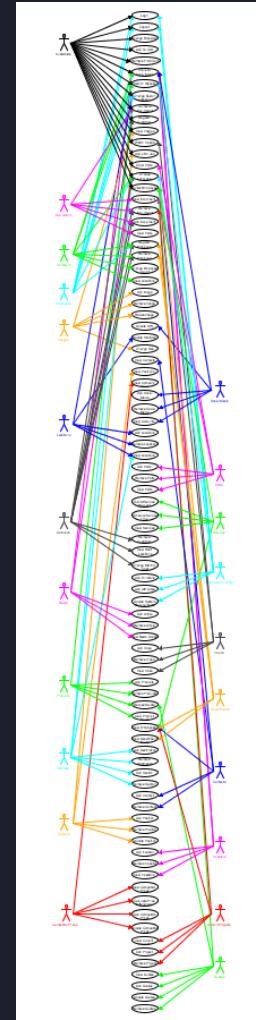
- Evolutionary Prototyping
 - Need user input for each refinement
 - This model reduces time and costs



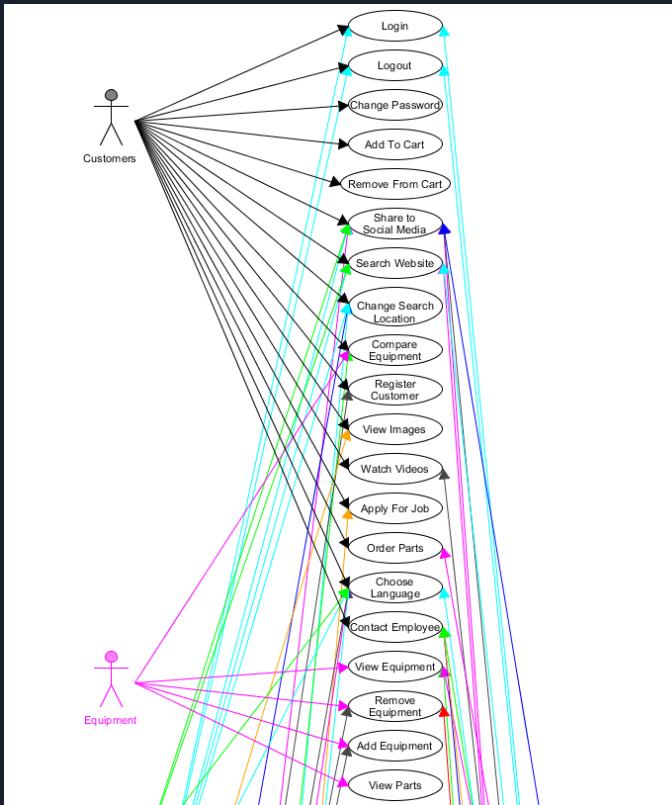
Tool Used: Visual Paradigm

Full Use Case Diagram

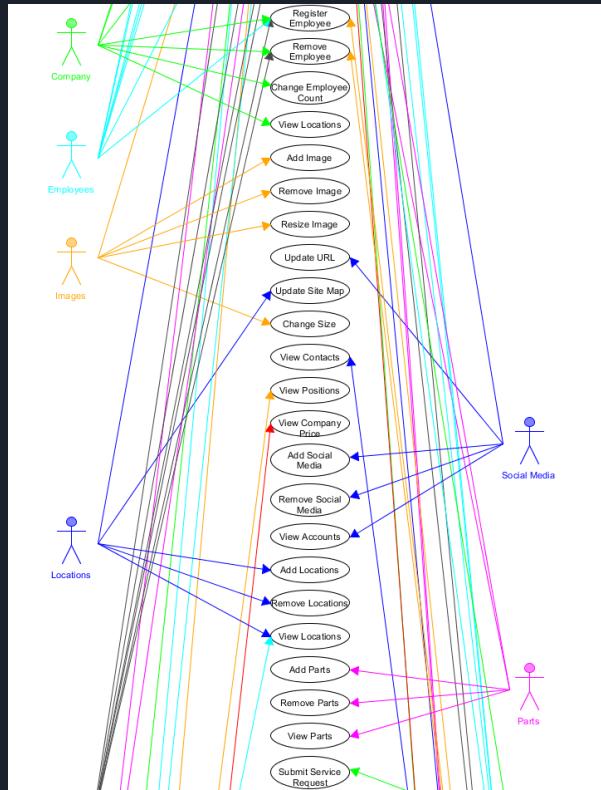
Tool Used: UMLet



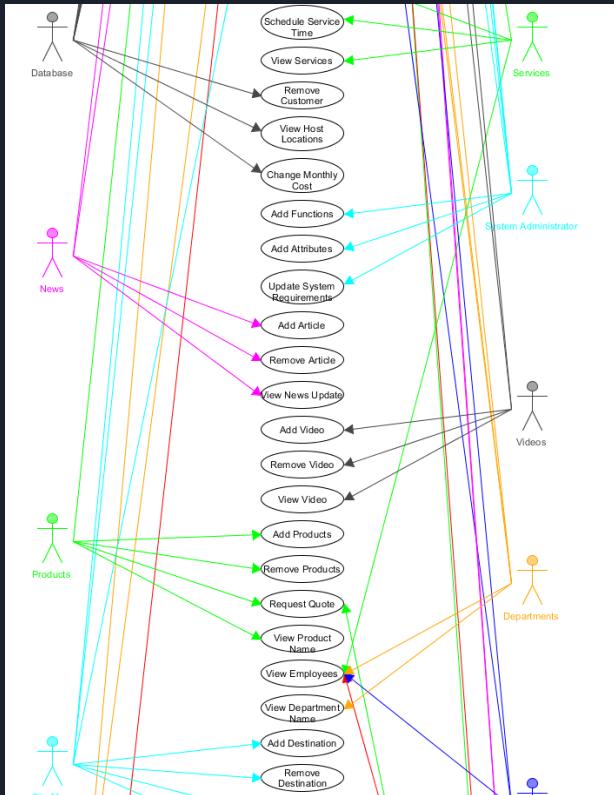
Use Case Diagram (1/4)



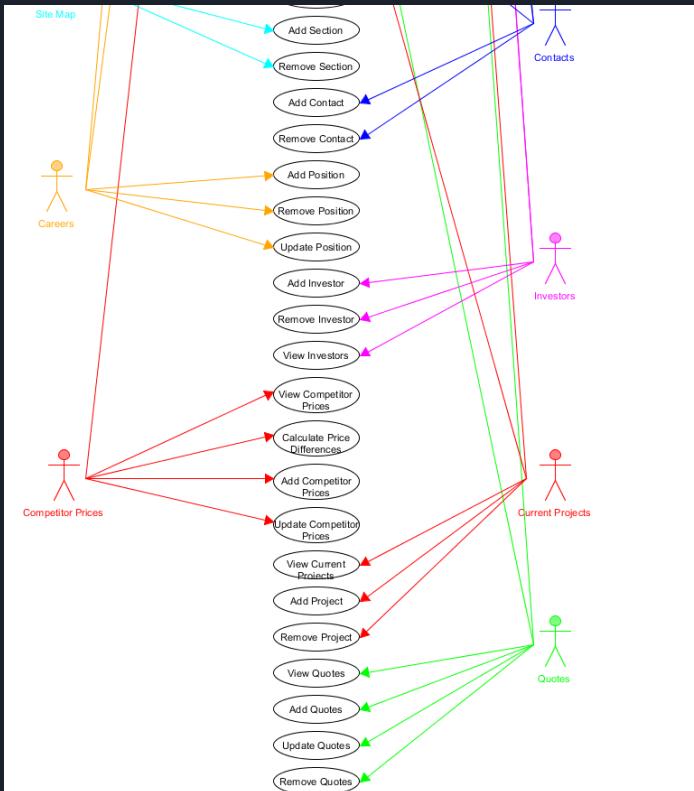
Use Case Diagram (2/4)



Use Case Diagram (3/4)



Use Case Diagram (4/4)



Full Class Object Diagram



Tool Used: IBM Rational

Class Object Diagram (1/3)



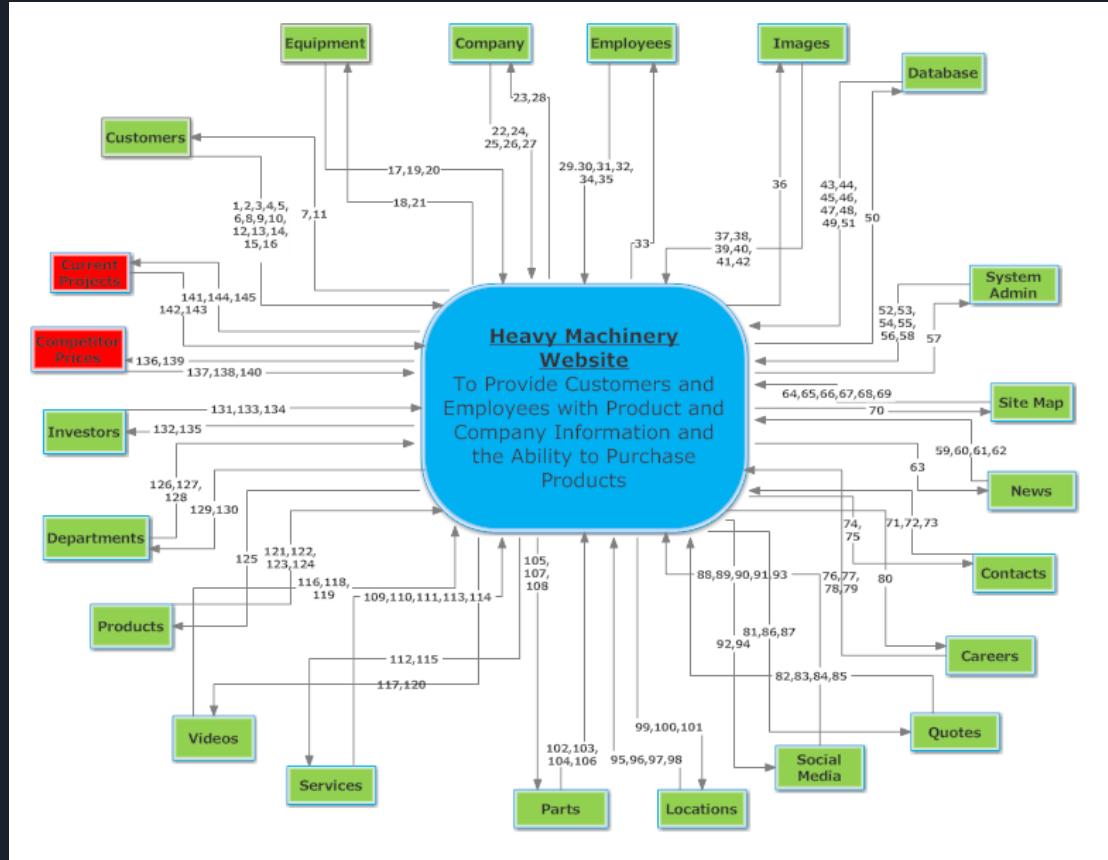
Class Object Diagram (2/3)



Class Object Diagram (3/3)

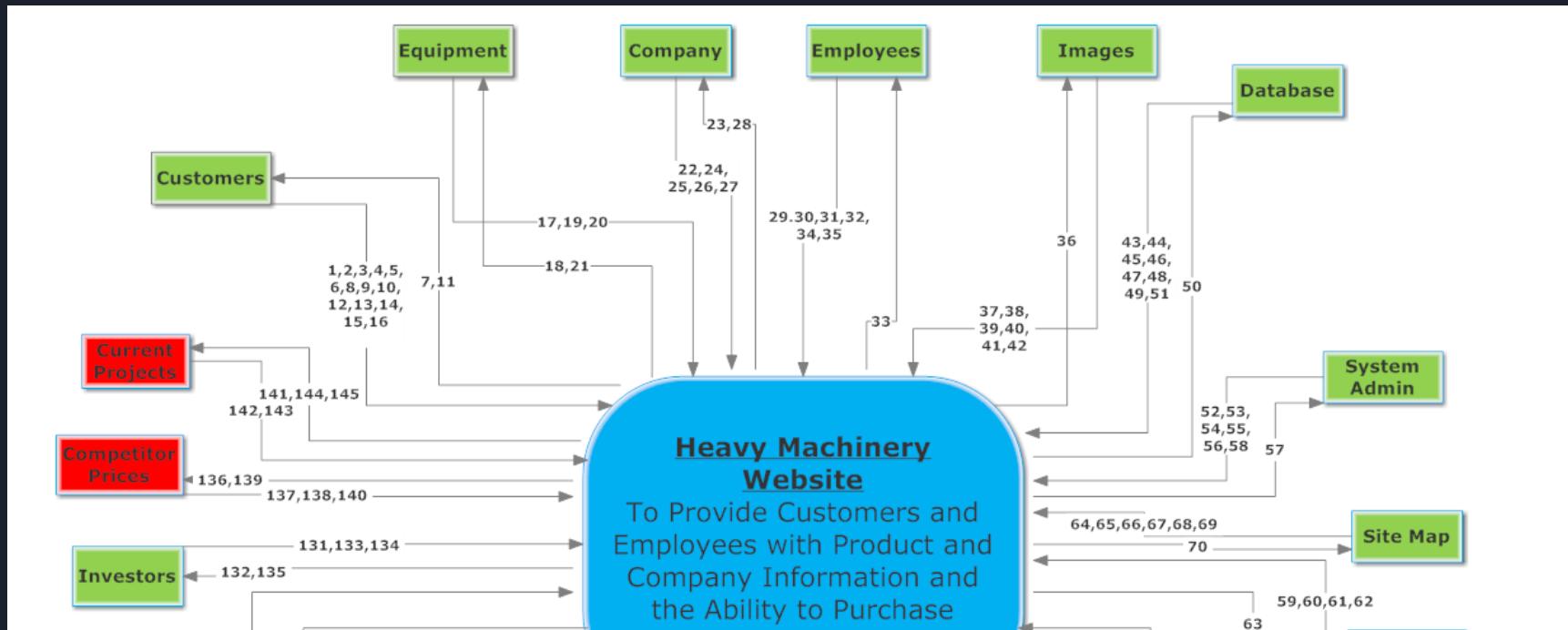


Full Context Data Flow Diagram

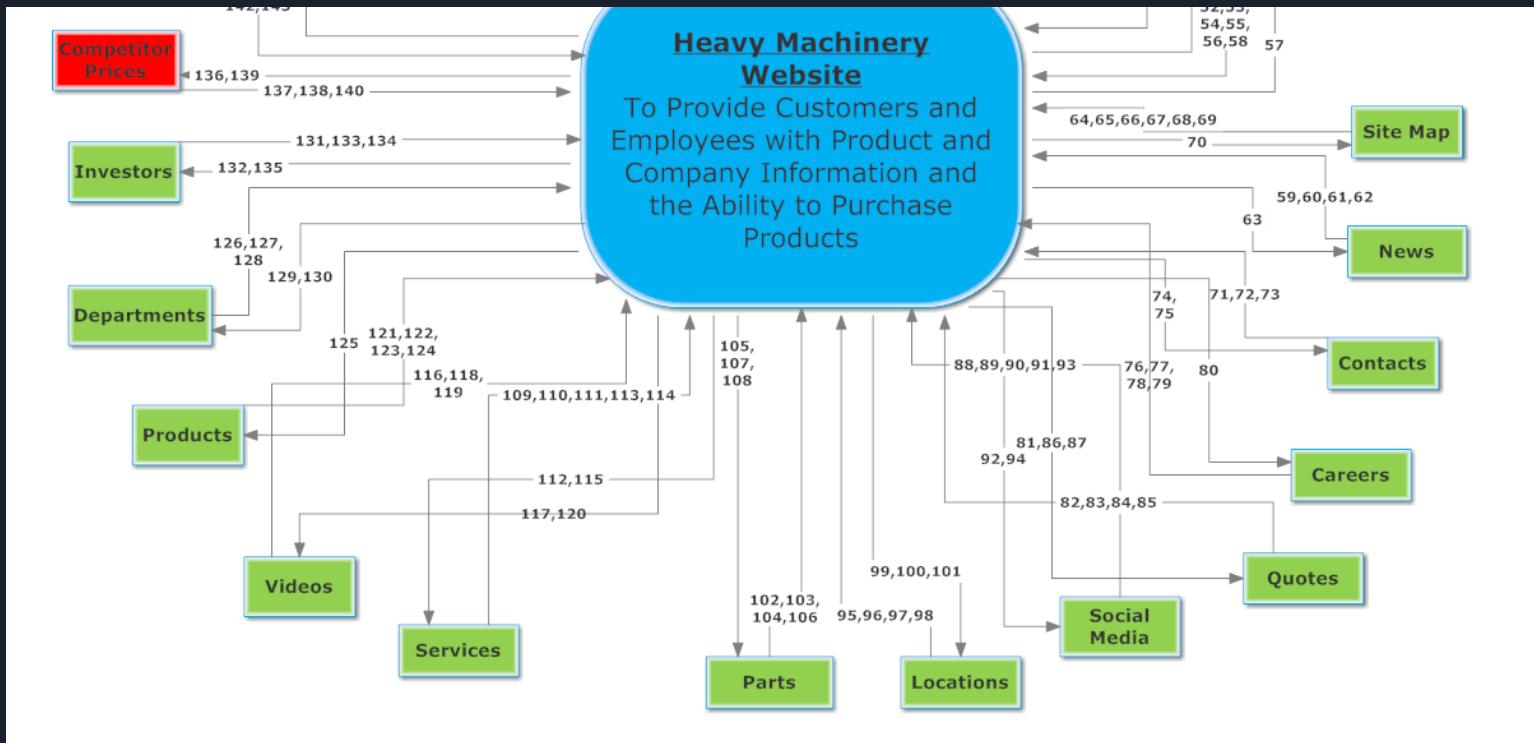


Tool Used: SmartDraw

Context Data Flow Diagram (1/2)



Context Data Flow Diagram (2/2)

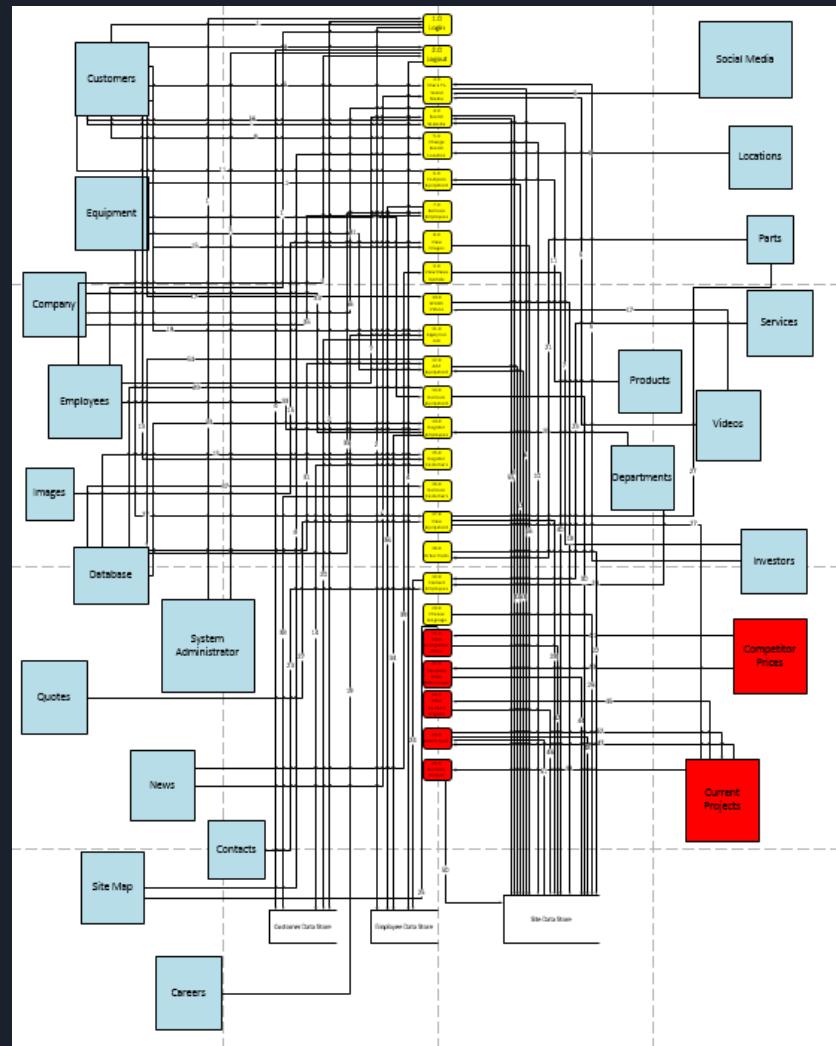


Context Data Flow Diagram Legend

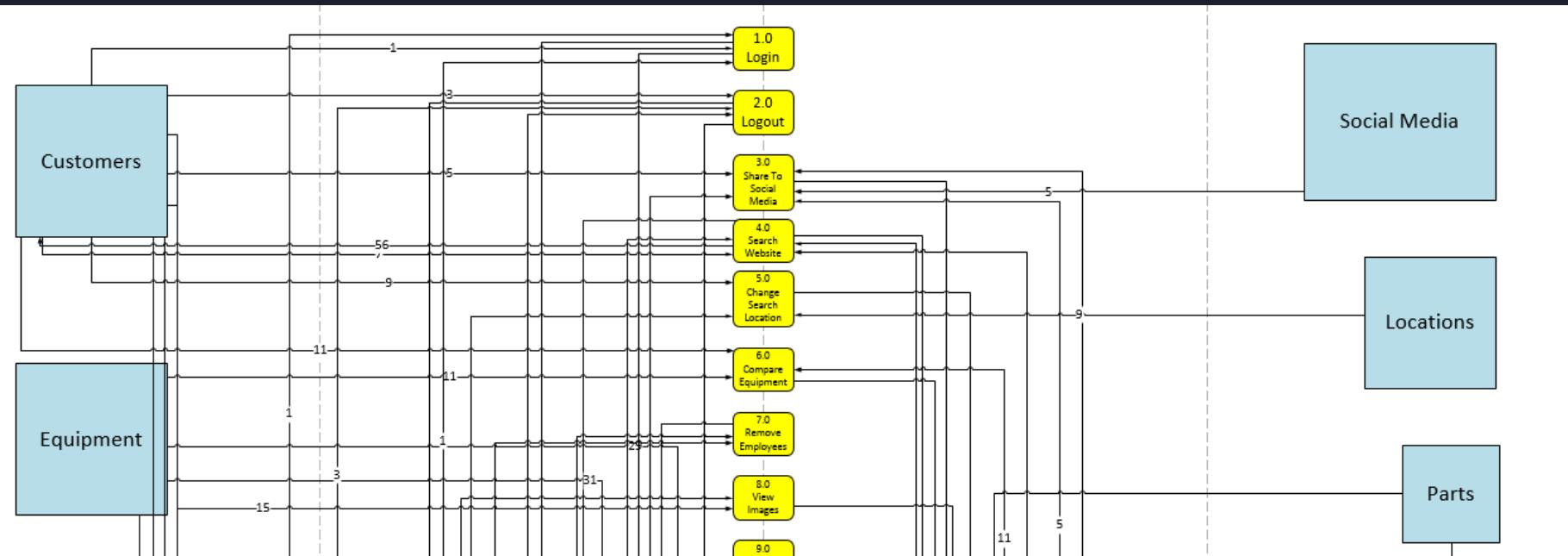
Context DFD Legend	
Customers	1. Change Password 2. Add To Cart 3. Remove From Cart 4. Login 5. Logout 6. Share to Social Media 7. Search Website 8. Change Search Location 9. Compare Equipment 10. Register Customer 11. View Images 12. Watch Videos 13. Apply For Job 14. Order Parts 15. Contact Employees 16. Choose Language
Equipment	17. Compare Equipment 18. View Equipment 19. Remove Equipment 20. Add Equipment 21. View Parts
Company	22. Share To Social Media 23. Search Website 24. Register Employee 25. Remove Employee 26. Choose Language 27. Change Employee Count 28. View Locations
Employees	29. Login 30. Logout 31. Register Employee 32. Share to Social Media 33. Search Website 34. Change Search Location 35. Choose Language
Images	36. View Images 37. Add Image 38. Remove Image 39. Resize Image 40. Change Size 41. Change Color 42. Update Position
Database	43. Register Customers 44. Remove Customers 45. Register Employees 46. Remove Employees 47. Add Equipment 48. Remove Equipment 49. Choose Language 50. View Host Locations 51. Change Monthly Cost 52. Login 53. Logout 54. Add Functions 55. Add Attributes 56. Update System Requirements 57. Search Website 58. Choose Language
System Administrator	59. Share to Social Media 60. Add Article 61. Remove Article 62. Choose Language 63. View News Update 64. Change Search Location 65. Choose Language 66. Add Destination 67. Remove Destination 68. Add Section 69. Remove Section 70. View Locations
Site Map	71. Contact Employees 72. Add Contact 73. Remove Contact 74. View Contacts 75. View Employees
Careers	76. Add Position 77. Remove Position 78. Update Position 79. Apply For Job 80. View Positions
Quotes	81. View Quotes 82. Add Quotes 83. Update Quotes 84. Remove Quotes 85. Request Quotes 86. View Equipment 87. View Customer Name
Social Media	88. Share to Social Media 89. Add Social Media 90. Remove Social Media 91. Update URL 92. View URL 93. Change Icon 94. View Accounts
Locations	95. Change Search Location 96. Add Locations 97. Remove Locations 98. Update Site Map 99. View City 100. View Address 101. View Locations
Products	121. Compare Equipment 122. Add Products 123. Remove Products 124. Request Quote 125. View Product Name
Departments	126. Register Employees 127. Contact Employees 128. Remove Employees 129. View Employees 130. View Department Name
Investors	131. Share to Social Media 132. Search Website 133. Add Investor 134. Remove Investor 135. View Investors
Competitor Prices	136. View Competitor Prices 137. Calculate Price Differences 138. Add Competitor Prices 139. View Company Price 140. Update Competitor Prices
Current Projects	141. View Current Projects 142. Add Project 143. Remove Project 144. View Equipment 145. View Employees
Services	109. Contact Employees 110. Submit Service Request 111. Schedule Service Time 112. View Employees 113. Update Cost 114. Update Location 115. View Services
Videos	116. Share to Social Media 117. Watch Videos 118. Add Videos 119. Remove Videos 120. View Video

Full Level-0 Data Flow Diagram

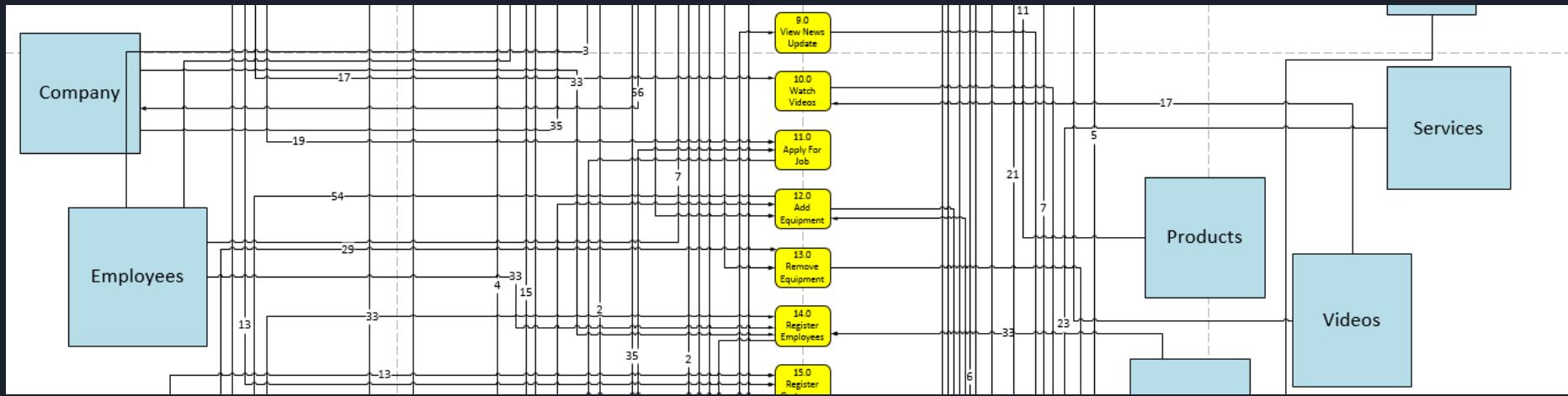
Tool Used: MS Visio



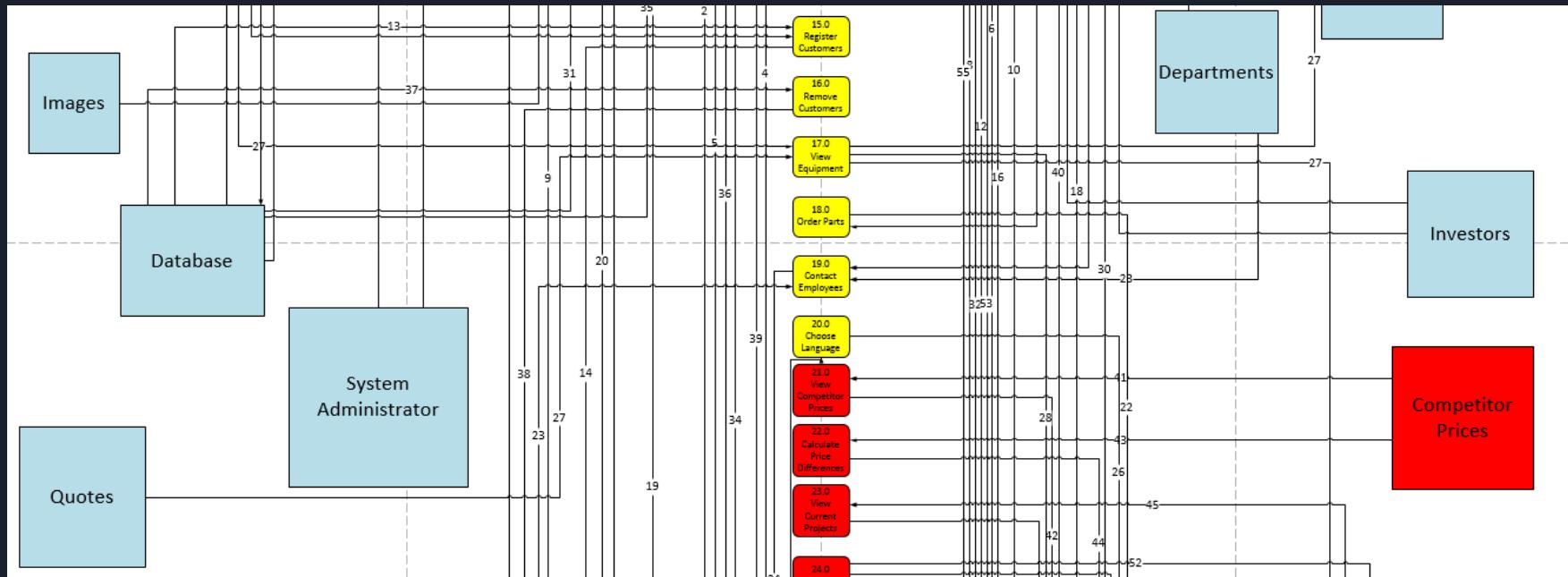
Level-0 Data Flow Diagram (1/4)



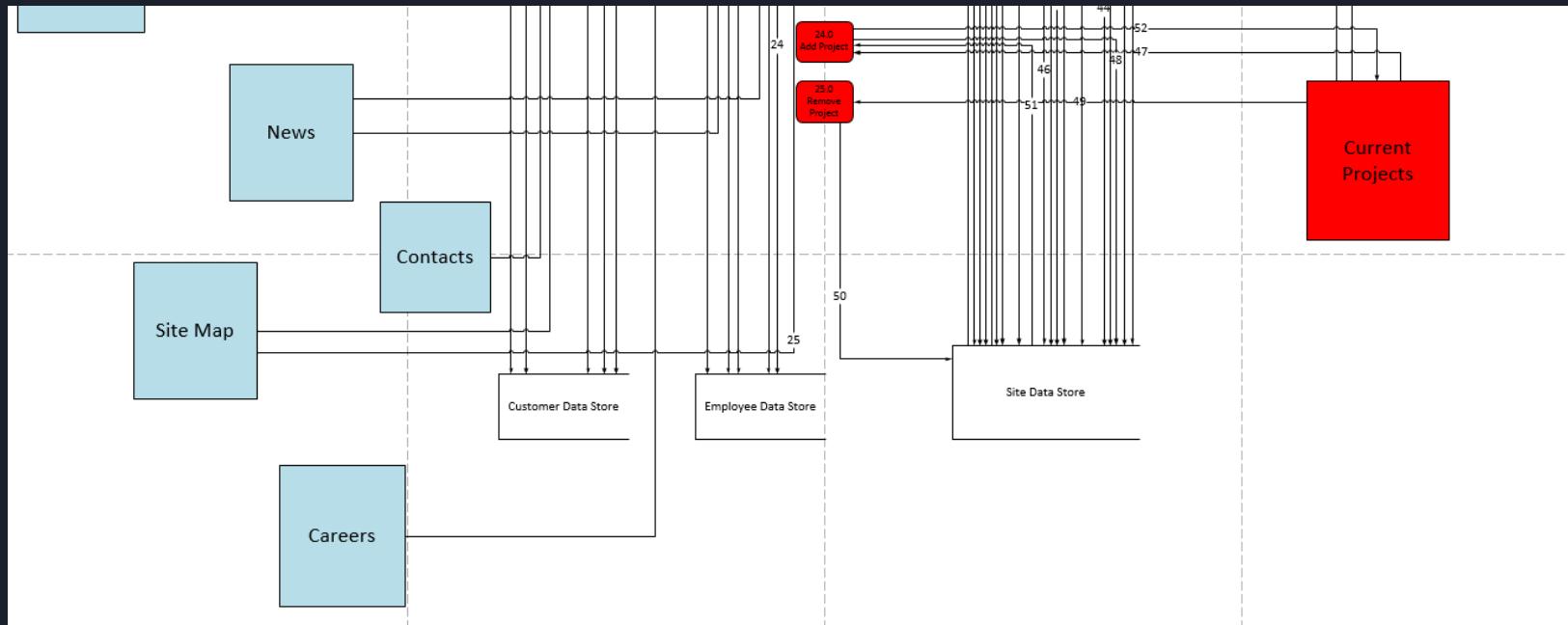
Level-0 Data Flow Diagram (2/4)



Level-0 Data Flow Diagram (3/4)



Level-0 Data Flow Diagram (4/4)

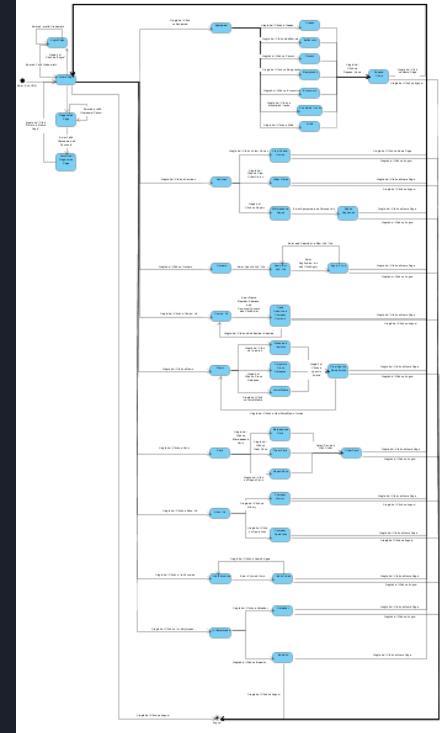


Level-0 Data Flow Diagram Legend

Legend

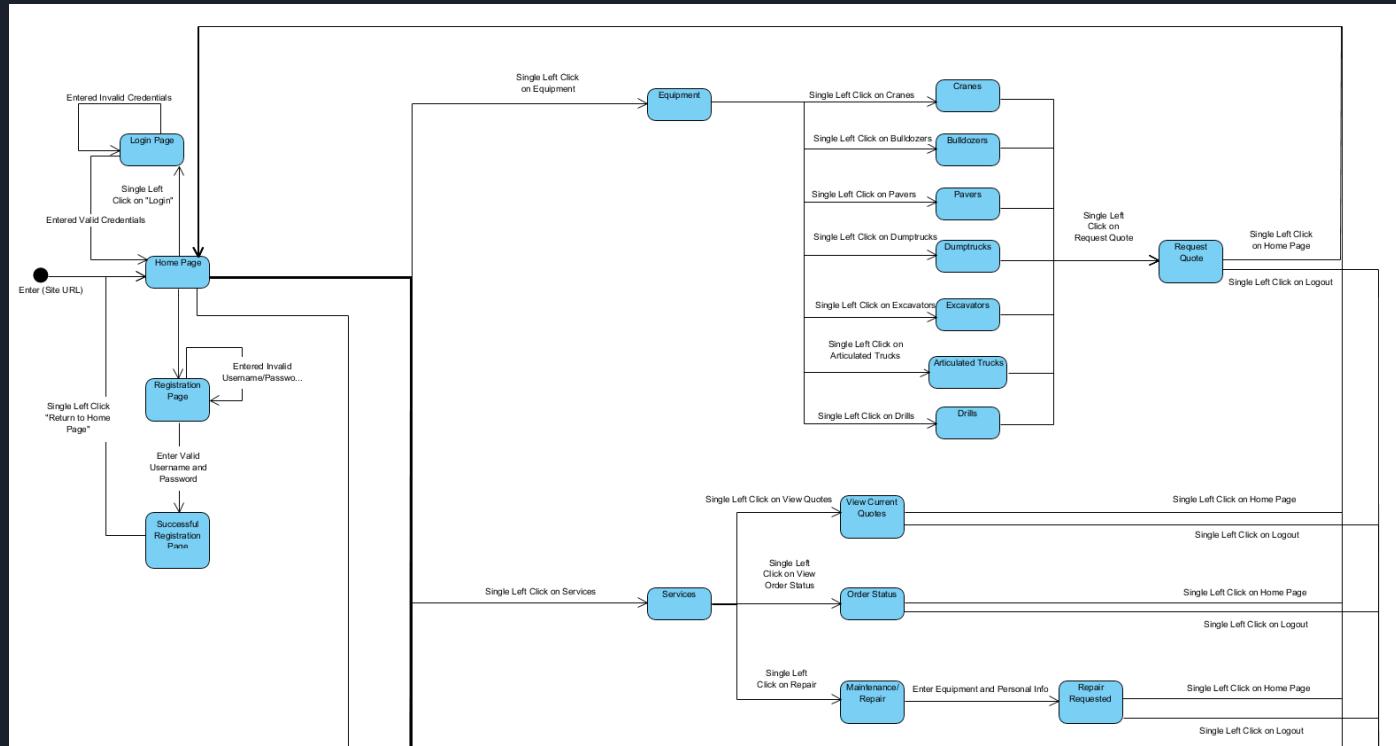
1. Enter Username and Password
2. Verify Username and Password
3. Click logout
4. Verify logout
5. Click link to share to social media
6. Verify correct credentials
7. Enter search request
8. Looks for requested info
9. Request for changing search location
10. Look for requested location
11. Choose two equipments to compare
12. Look for equipments properties
13. Enter all customer requirements
14. Store customer information
15. Click on image
16. Request source image size
17. Click on video
18. Request source video to play
19. Click on position
20. Send application
21. Add parts to shopping cart
22. Pay and send payment info
23. Send message to employee
24. Deliver message to employee email
25. Choose different language on website
26. Find language translation
27. Request to view equipment
28. Retrieve equipment information
29. Select equipment to remove
30. Remove from database
31. Select equipment to add
32. Add equipment to database
33. Enter all employee requirements
34. Store employee information
35. Choose Employee to remove
36. Remove employee from database
37. Choose customer to remove
38. Remove customer from database
39. Choose News to view
40. Retrieve valid news update
41. Request competitor price
42. Retrieve competitor's price
43. Choose two prices to calculate
44. Retrieve and calculate comparison
45. Request to view project
46. Retrieve equipment project
47. Select project to add
48. Add project to database
49. Select project to remove
50. Remove project from database
51. Send updated project info
52. Update project info
53. Send updated equipment info
54. Update equipment info
55. Send retrieved info
56. Retrieve searched info
57. Send calculated competitor prices
58. Update competitor prices

Full State Transition Diagram

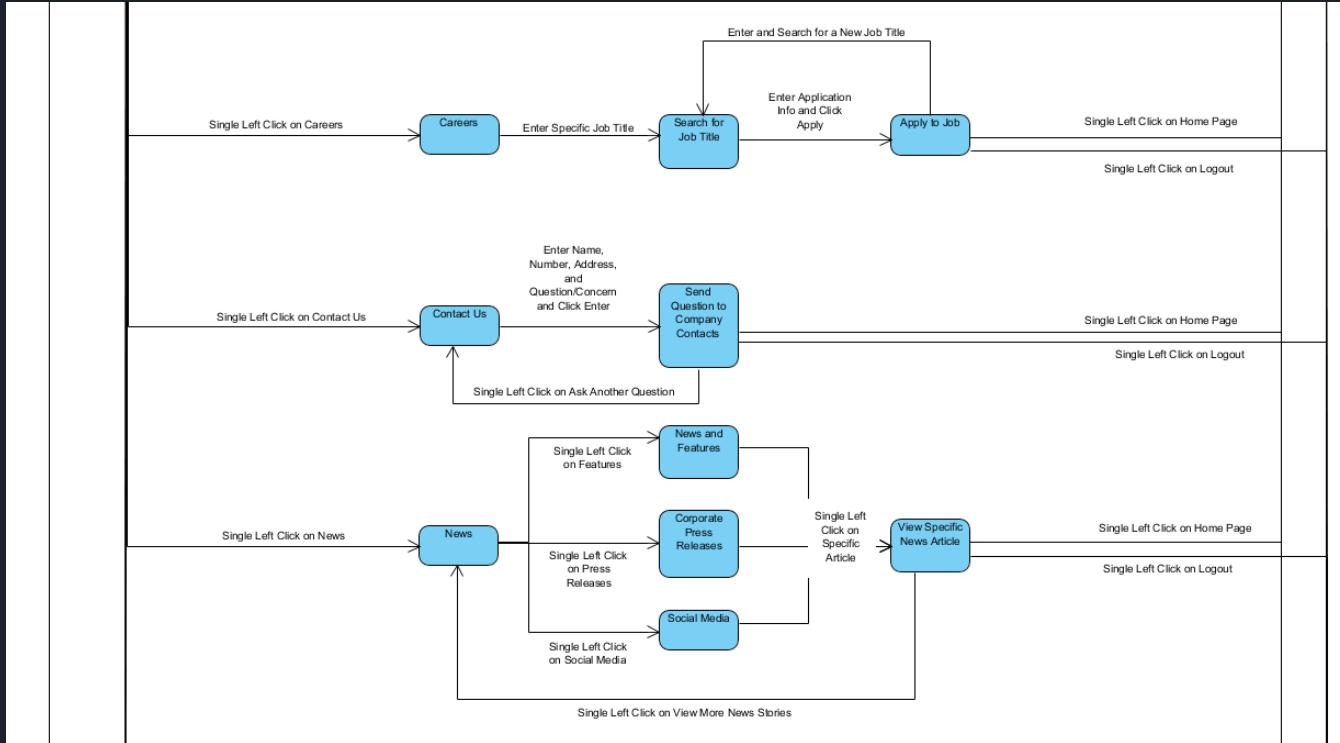


Tool Used: Visual Paradigm

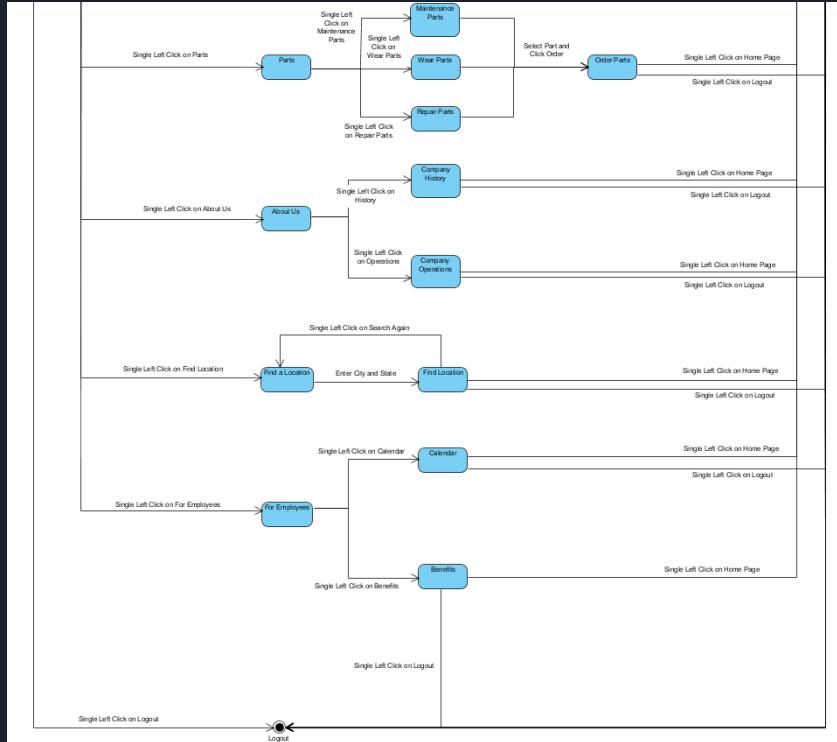
State Transition Diagram (1/3)



State Transition Diagram (2/3)

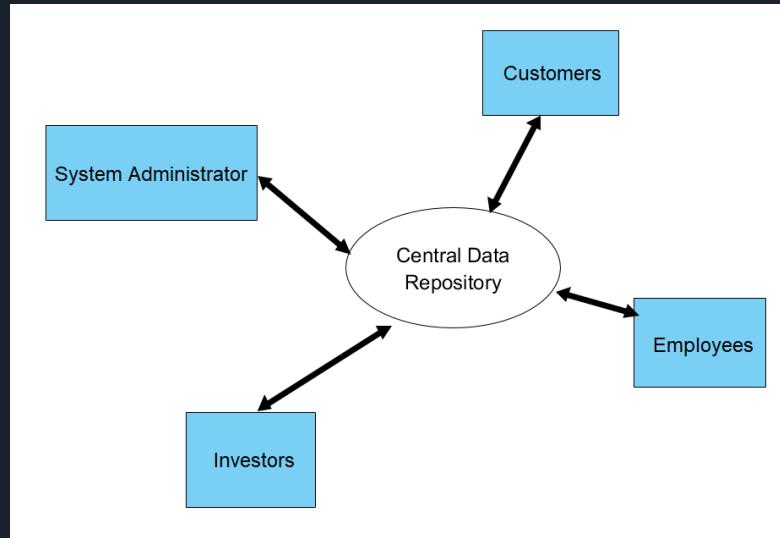


State Transition Diagram (3/3)



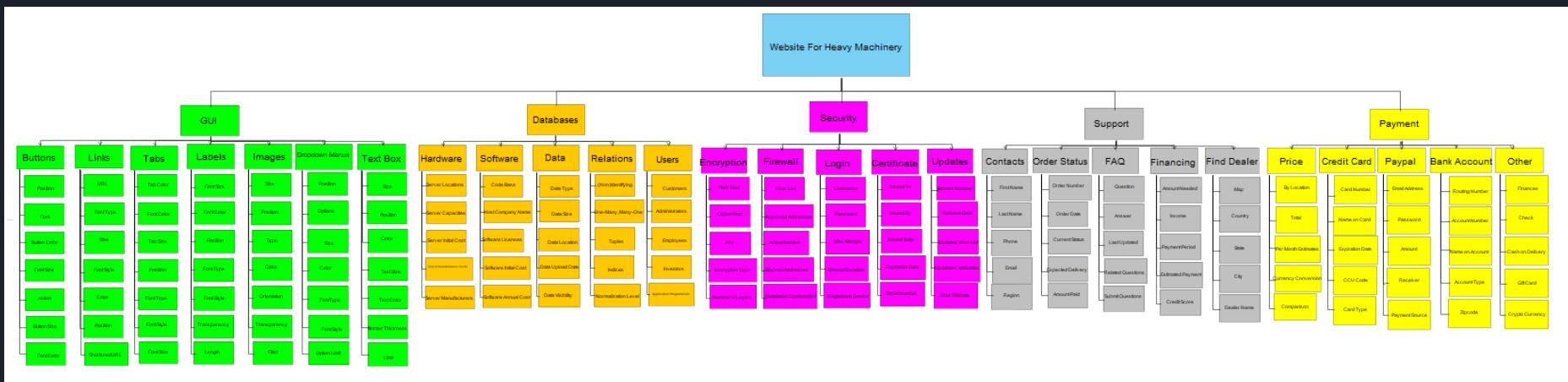
Software System Architectural Model

- Data Centered
 - Integrability: new clients can be added and existing can be changed
 - Client software accesses a central repository



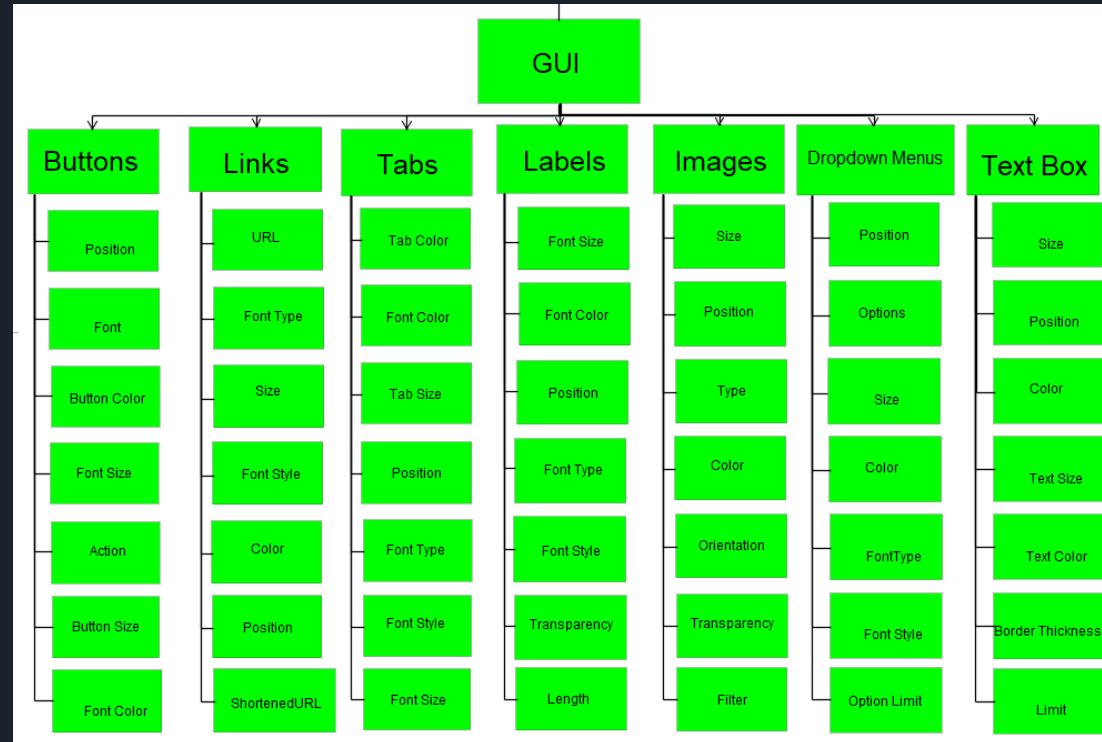
Tool Used: Visual Paradigm

Hierarchical Design Model

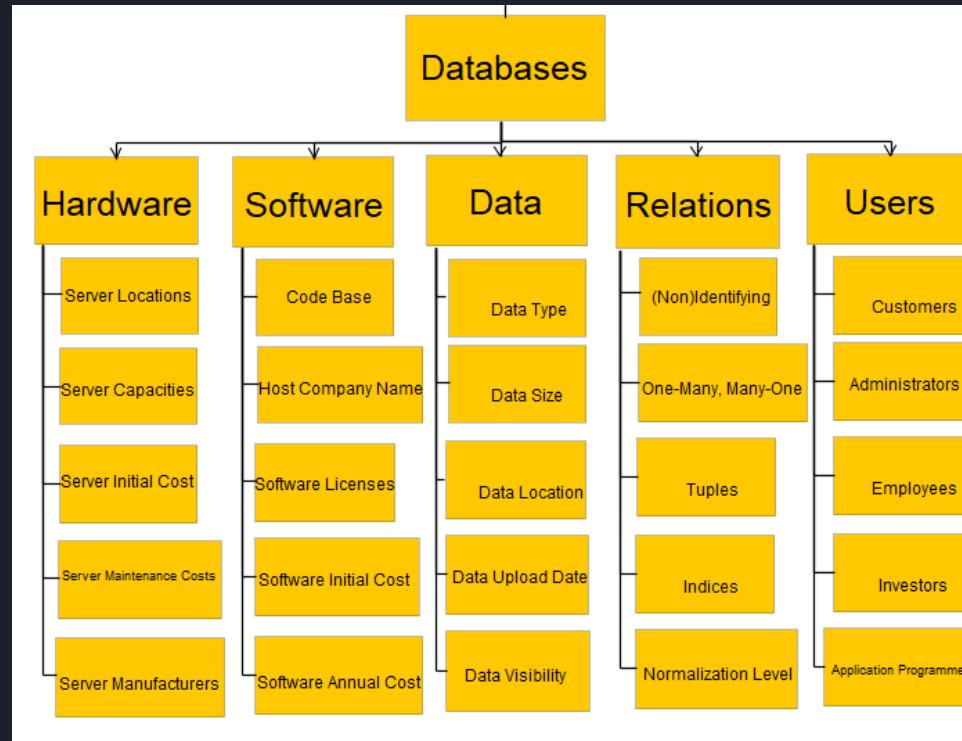


Tool Used: Visual Paradigm

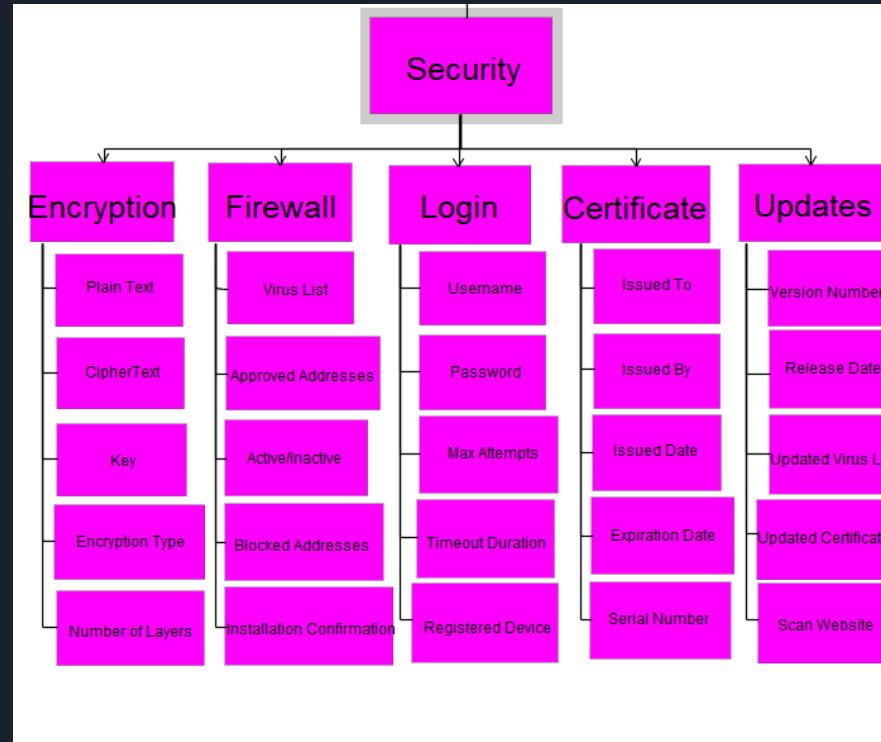
Hierarchical GUI Subsystem



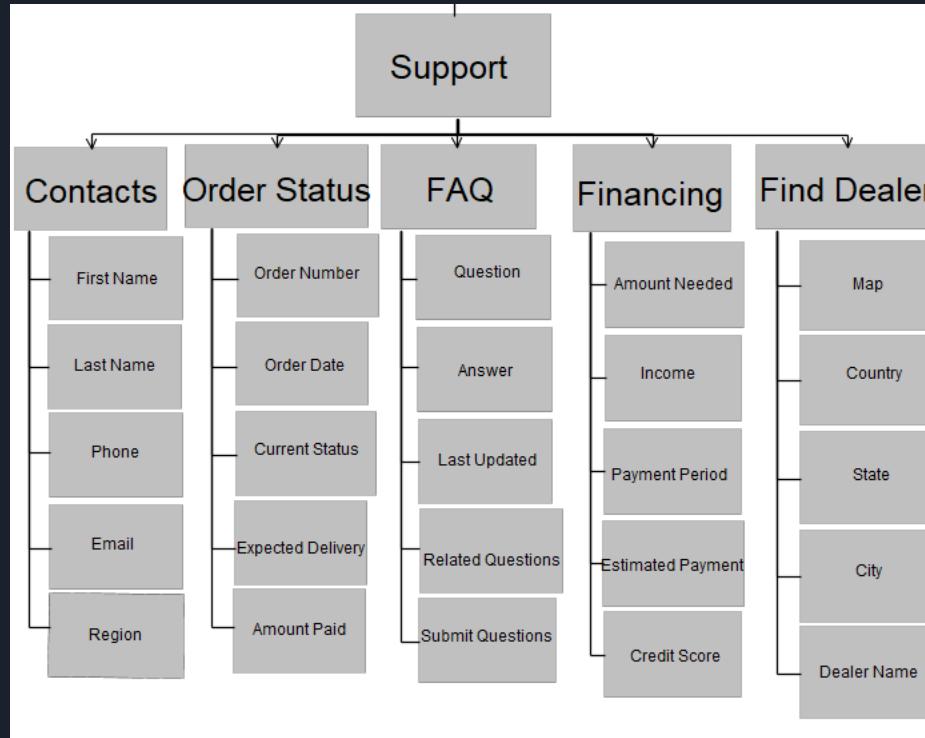
Hierarchical Database Subsystem



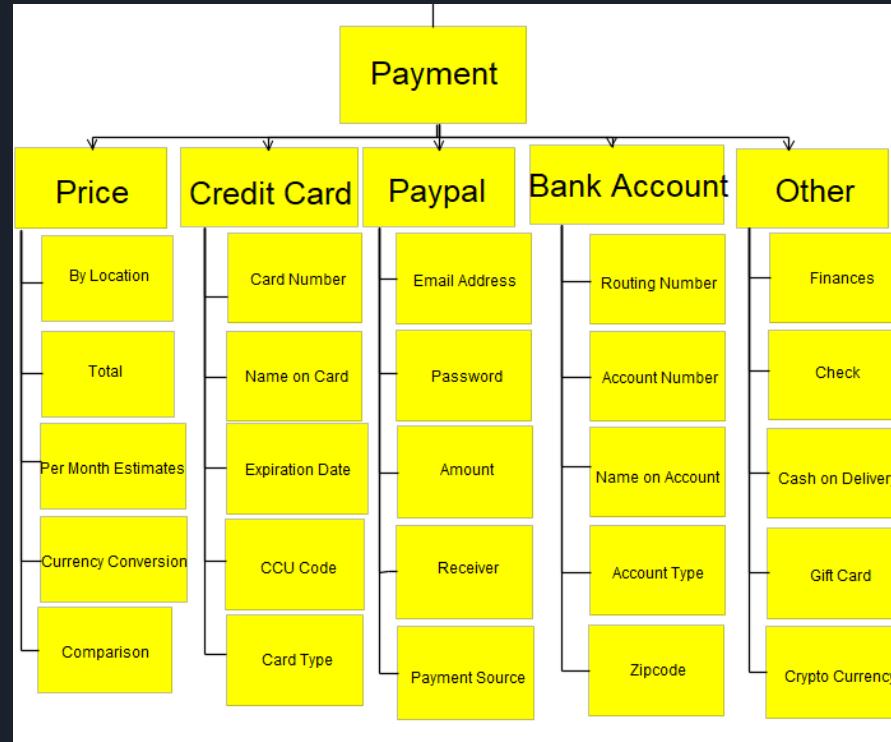
Hierarchical Security Subsystem



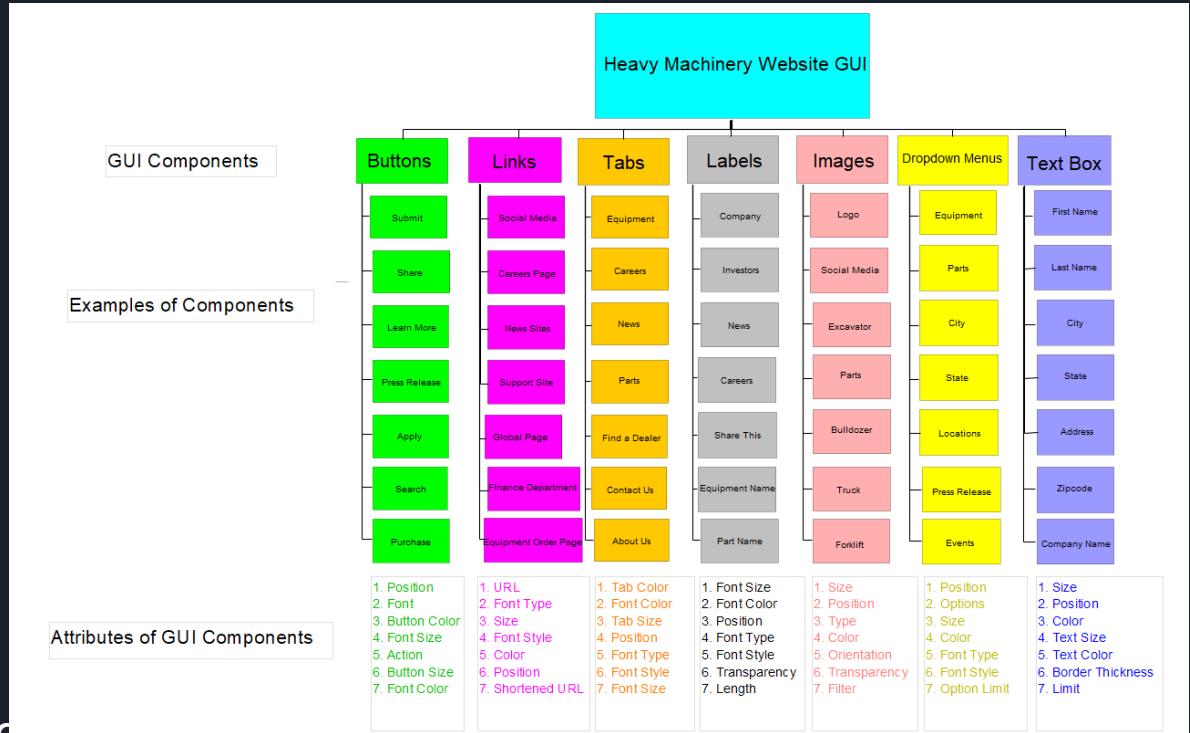
Hierarchical Support Subsystem



Hierarchical Payment Subsystem

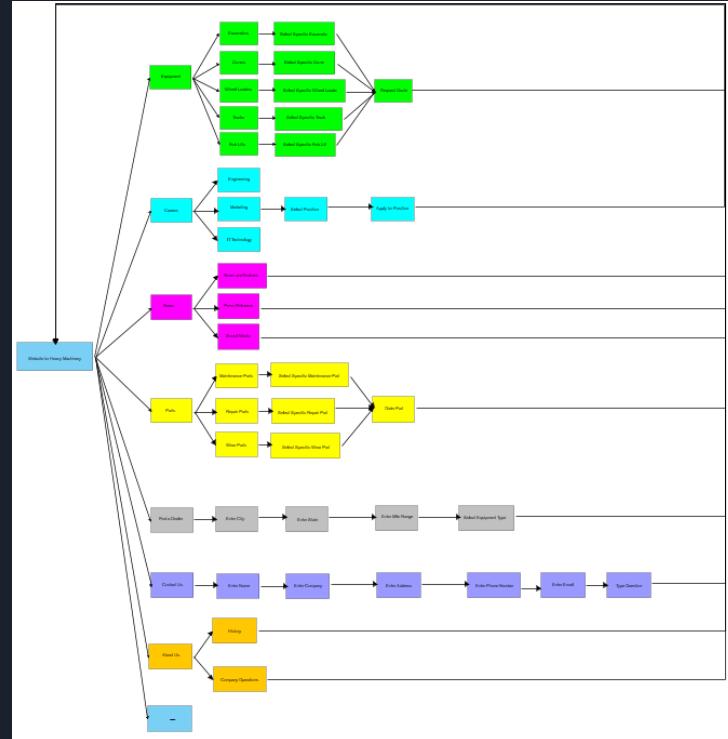


Hierarchical GUI Components View: OPTIONAL PART



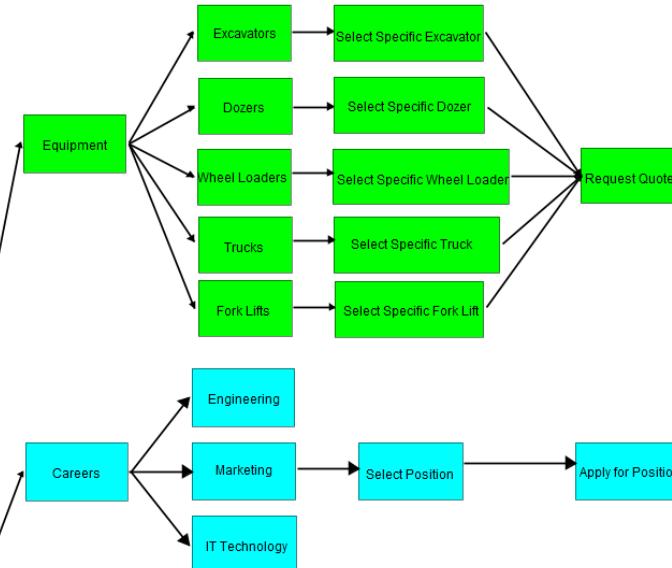
Tool Used: Visual Paradigm...

Hierarchical GUI Design Model

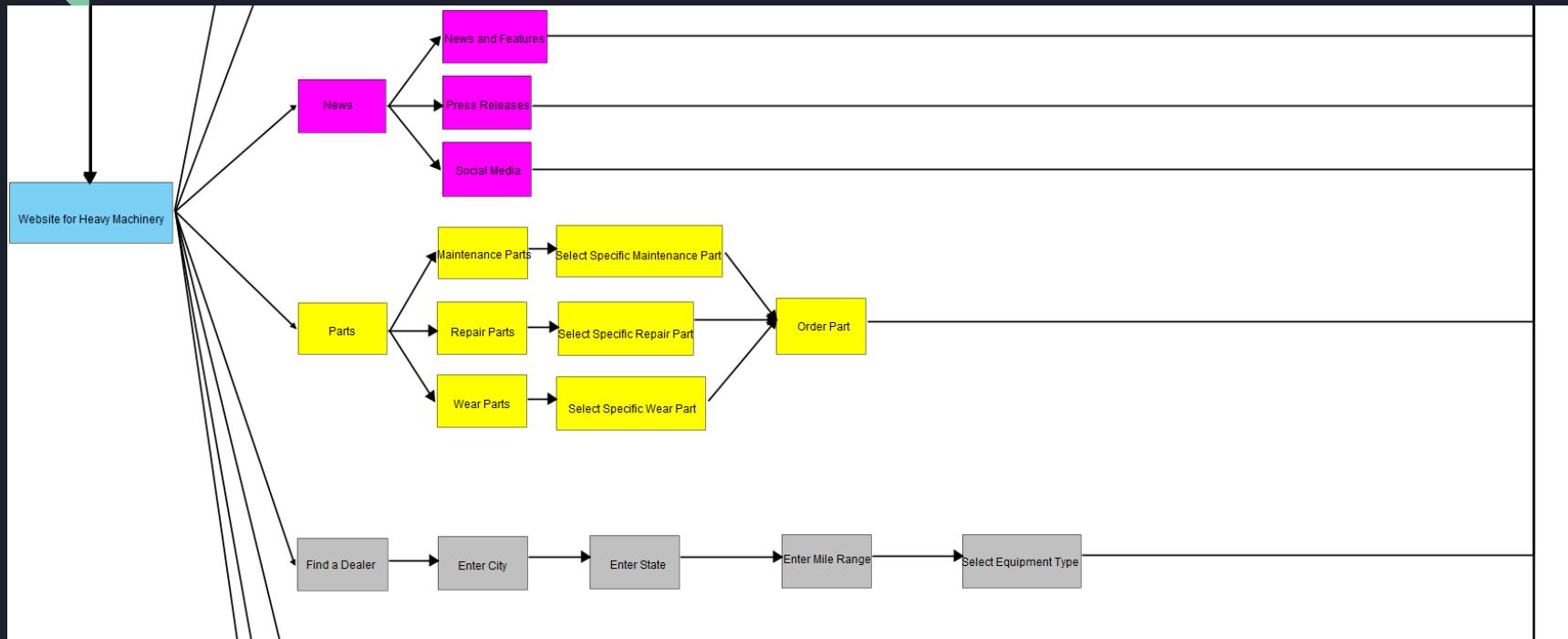


Tool Used: Visual Paradigm

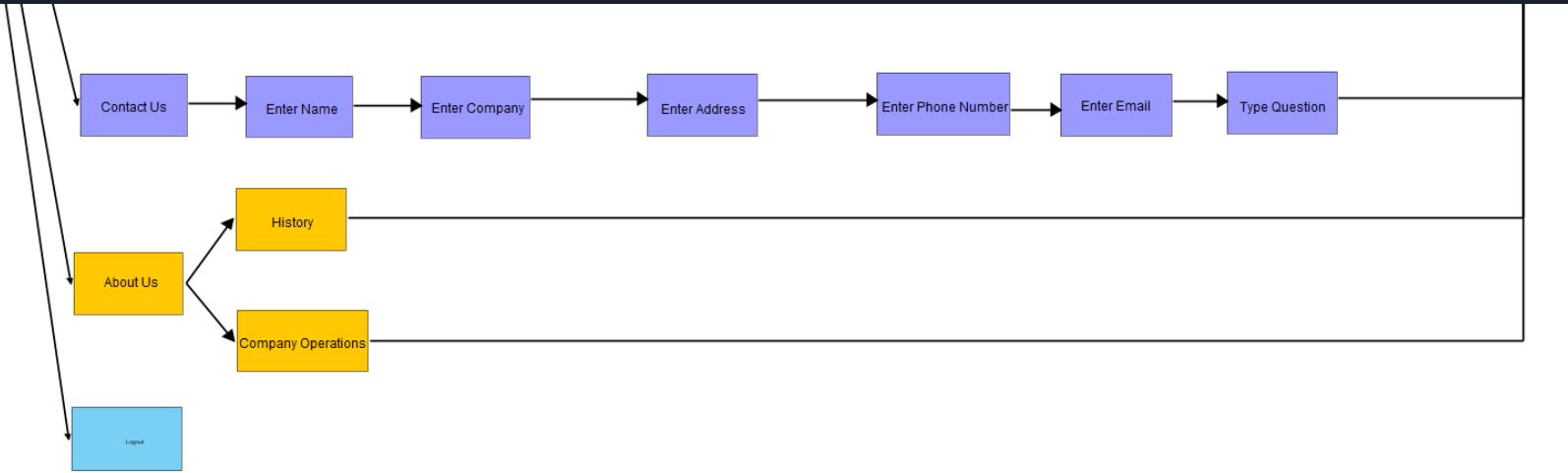
Hierarchical GUI Design Model (1/3)



Hierarchical GUI Design Model (2/3)



Hierarchical GUI Design Model (3/3)



LOC-Based Estimation

Function	Estimated LOC
Graphic User Interface	9,500
Equipment and Price Comparisons	1,500
Database Management	13,000
Location Finder	5,000
Total:	29,000

Average Productivity: 620 LOC per month

Burdened Labor Rate: \$8,000 per month

Cost per Line of Code: \$13

Estimated Effort: 47 person-months

Estimated Project Cost: \$377,000

FP-Based Estimation

Info Domain Value	Optimal	Most Likely	Pessimistic Estimation	Estimated Count	Weight	FP Count
Inputs	15	20	25	20	4	87
Outputs	15	20	30	20	4	72
Inquiries	10	15	20	15	5	79
Files	7	10	15	10	6	55
External Interfaces	2	3	4	3	7	20
Total						313

Average Productivity: 6.5 FP per month

Burdened Labor Rate: \$8,000, \$1,230 per month

Estimated Effort: 48 person-months

Total Estimated Cost: \$386,000

Resources

itpro.co.uk/611782/blade-networks-industry-ready-for-10gb-ethernet

<https://constructionreviewonline.com/2017/04/topconstruction-equipment-manufacturers/>

<https://www.caterpillar.com/>

<https://www.komatsuamerica.com/>

<https://www.volvoce.com/united-states/en-us/>

<http://www.hitachi.us/>

<https://www.liebherr.com/en/usa/products/construction-machines/construction-machines.html>

<https://www.sanyglobal.com/>

<https://zoomlion-na.com/>

<https://www.terex.com/en>

<http://www.doosanequipment.com/dice/index.page?>

<https://www.deere.com/en/index.html>



Thank you

Course: CS 390
Team #: 6
Team Members: Brad, Tyler