

**BIG BODY: A COLLABORATIVE PLATFORM FOR
BODYBUILDING AND NUTRITION**

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MASTER OF SCIENCE

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ABSTRACT

Health and a supple body has been seen as a prized possession by almost every culture. Witnessing our body grow and come alive with health after months of hard work is an unparalleled feeling. Bodybuilding tends to improve our self confidence immensely. The paper describes the software that I have built to bring the relevant information needed to build an attractive and healthy body. It describes an online store application built using PHP-MySQL that provides supplements for bodybuilding for different body types. A customer can browse products, chat online with customer representatives and write reviews for the products. Customers can also compare prices for products and have access to blogs.

In this paper, I have incorporated features supported by the application in detail for multiple modules that form the system. This paper also develops some novel features that are not typically available on commercial and well known nutritional product websites.

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CHAPTER 1. INTRODUCTION AND MOTIVATION

Overall health has always been considered a boon and an important ingredient for a happy and satisfied life. Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. According to a report published by the Council on Foreign Relations, health may be linked to political stability, financial security and social strength [1]. Healthy people make the nation's base more stable. There is a huge body of evidence suggesting that healthy living both in terms of exercising, eating well, and staying on top of health screenings and ' visits can keep you living healthy and living longer. In an evaluation of around 20,000 people[2], it was found that people can add 14 years to their life if they exercise regularly, consume a nutritious diet and avoid smoking.

But in the recent times, achieving overall health has become a challenge. Mental stress, improper diet, decline in average physical inactivity, and undesirable toxins have taken their toll on human mechanism. Despite how common health problems are, many of us make no effort to improve our situation. The strength of your health directly relates to the level of happiness, satisfaction, and contentment, your experience in life, as well as your overall health and well-being. There are many ways to achieve good health.

Bodybuilding is one sport that may help achieve overall health by eliminating these problems as it has benefits of both weight training and aerobic exercises [3]. Bodybuilding decreases the risk of heart disease, improves mental health, and develops healthy joints. But there are other perks too. After lifting your personal best at the gym, there you are sweaty and worn out and still feeling good. And that feeling carries over and translates into the way you present yourself as well as how you are perceived by others.

Bodybuilding is also a sport that requires a lot of motivation to keep up. Collaboration between bodybuilders can play a crucial role in the progress. A good coach in the form of a person or an online can become important to achieving the desired results.

My main motivation for this paper is that after starting working out in gymnasium, I realized that I knew very little of the sport. Whenever I asked other people around me about my doubts, everyone knew some bits and pieces and I often got conflicting advise. Even online, there are varied points of opinion on a simple issues like which supplement to take at a given stage. It is then I conceived the idea of creating a common platform to bring the enthusiasts like myself together, collaborate, and put the pieces together to make a whole. Expanding on that, I added the nutritional supplement information and related products that interested people can buy and further write down their comments and suggestions about the products thereby increasing the knowledge and support base for other collaborators.

In a nutshell, this paper is an outcrop of the idea of collaboration, and I have implemented the idea in the form of a website. The work of this paper, in the form of a website, develops a platform for health and bodybuilding enthusiasts. One of the main drivers of this work is my own interest in this field. The platform is designed to be collaborative inthat users can buy or subscribe to a health product or health expert's blog feeds. This website also aims at presenting health and nutritional supplements, and up to date research on bodybuilding control methods and supplements.

Just like any modern product oriented website, this platform has the basic modules of secure authentication and authorization (though through a third part application), customer chat functionality, blogging, listing, and sorting. Apart from these basic functionalities, some novel features like product sharing on Whatsapp, instant price comparison, and accessing the website as an android application is also

incorporated. Instant price comparison is particularly helpful when someone likes a product and would like to know its price that is listed on multiple avenues/websites. This seemingly obvious feature is surprisingly missing on major bodybuilding websites but looking at its utility, I have incorporated this feature in this platform. So this platform has the following features that are not readily found in major bodybuilding websites.

- Product sharing on Whatsapp
- Instant price comparison from multiple websites
- Saving the website shortcut as an Android Application Package (APK)

The website named Big Body.in is built using PHP and MySQL. A part of this application is e-commerce which means the customer could buy bodybuilding products based on their requirements. The paper is organized as follows. Chapter 2 discusses the literature. Chapter 3 describes the system modules and their functionalities in detail. Chapter 4 discusses the technologies used to create the system. Chapter 5 presents the actual system design and implementation and Chapter 6 concludes the paper and lists the future work.

CHAPTER 2. LITERATURE REVIEW

This section presents some of the bodybuilding websites that are the foundation of this work. As with any new work or process, there lies a body of work already done on that front, the same is true with this website. Some well-known websites for bodybuilding resources are: BodyBuilding.com, the VitaminShoppe.com and Amazon.com. Being massive e-commerce platforms, these websites are very well structured and organized.

Presented below are some of the features that these websites have but Big Body do not and vice-versa. Features that are available on these websites but not on Big Body are:

- Food recipes: Bodybuilding.com has quick and simple food recipes feature that is quite useful for people who believe that cooking is a difficult task and time consuming. They have the recipes for breakfast, pre-lunch, post lunch, dinner, post work out etc. This website has an impressive array of food recipes that enthusiasts can cook under 15 minutes or less. Besides that it has recipes listed according to customers bodybuilding goals like gaining lean muscle, or mass gain etc.
- Kids Supplements: Kids who tend to irregularly, TheVitaminShoppe.com has supplements that emulate well-balanced meals made from fresh, whole foods. TheVitaminShoppe has kids supplements that completes the need of missing nutrients in such kids. I believe that it is good to have this feature on such websites because this targets kids under age of 12 which is an under serviced category of customers.

They have multivitamins, like Vitamin A that promotes normal growth and development; tissue and bone repair; and healthy skin, eyes, and immune responses, Vitamin Bs- The family of B vitamins – B2, B3, B6, and B12 – aid metabolism, energy production, and healthy circulatory and nervous systems, minerals, digestive health supplements etc.

- Full Account Management: Being of high transactional nature, these websites allow customers to create and manage their own accounts. These personal accounts help customers to keep track of their order history, their goals, their body weights, and follow feedback from other customers etc. Customers can upload their pictures, and can also connect with other people through Facebook.

Since these are e-commerce websites, they also have a sophisticated cart management system. This work in the form of a website has tried to add the the following novel features.

- Inter site price comparison: Price comparison in Big Body feature allows the customer to compare, for a product, simultaneous prices listed on multiple websites in one place, giving the customer a bird's eye-view of the market. Its one of the important contribution to bodybuilding websites that allows customer to compare/see prices with other websites at one stop shop. Ultimately, price comparison functionality is a great feature for any consumer wishing to save money and looking for the best deal. That allows customers to evaluate prices of their favorite products, across the variety of vendors in one place, which eliminates the need to hunt down the best deal for hours on end and also reduces the pain of customers to visit other websites just to see the price of the same product. If they wish to visit other websites they just need to click the price mentioned on Big Body, and they will be redirected to the same product page on other websites. This way it reduces the load for a customer to visit

different websites, and find the same product and compare the prices. Figure 1 visually depicts the price comparison feature.

There is always a possibility adding price comparisons from other known websites like Bodybuilding.com etc, but it is always dependent upon the availability of API provided by these platforms. Currently, as a proof of concept, we used only two websites for comparison with ours. In future, there is a motivation to add more depending upon the API availability.

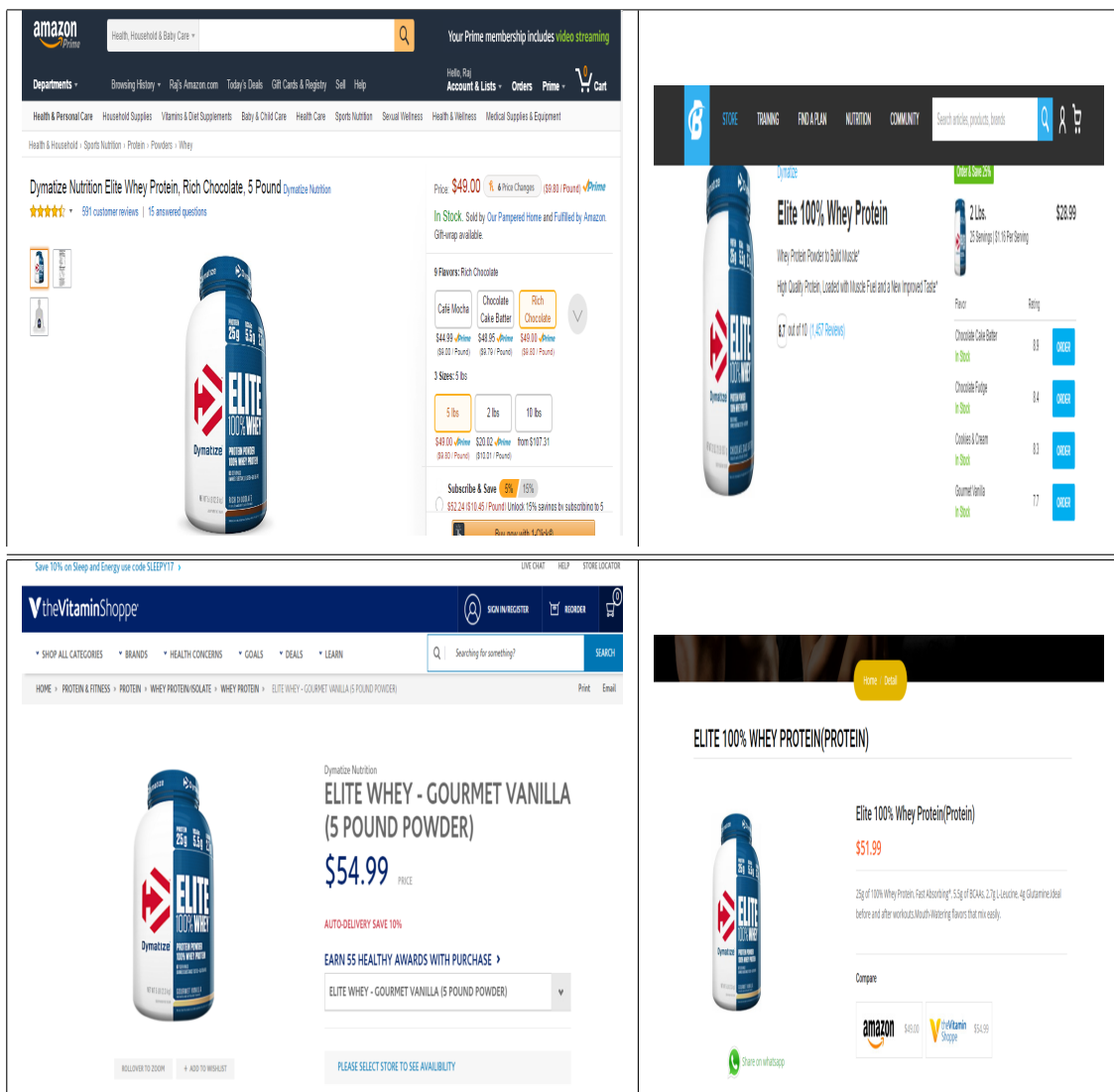


Fig. 1. Price Comparison Feature

- Whatsapp instant share: Second contribution to body building platforms is sharing the BigBody products/supplements on WhatsApp messaging application. WhatsApp, the social messaging service acquired by Facebook for 19bn dollars sin 2014, is arguably the worlds fastest-growing communication app. As on January 2015, half a billion people around the world were regular, active WhatsApp users. These users are sharing more than 700 million photos and 100 million videos every single day. In India, its even more popular than Facebook. It has already replaced SMS and fast becoming our primary mode of communication. Now, how this feature will work for users? First this feature will work only in mobile phones whether it IOS or android phone. It will work in both OS. WhatsApp share feature or button will be shown under each and every product on the Big Body page.

Once customer clicks on the WhatsApp icon displayed under the product, the user will be redirected to the WhatsApp application with a link that they can share directly among their WhatsApp contacts and Groups without the need of copying the product URL and opening the App and pasting it there. They can directly share any product. Figure 2 visually depicts the Whatsapp instant share feature.

Sharing product, articles, blogs etc. on Facebook, Twitter, Instagram are common in these website or any website but sharing on WhatsApp is not available on well-known other body building websites.

Some of the basic functionalities that these websites and Big Body website have are Facebook login, searching of products, giving reviews, search product by brand, by type, etc.

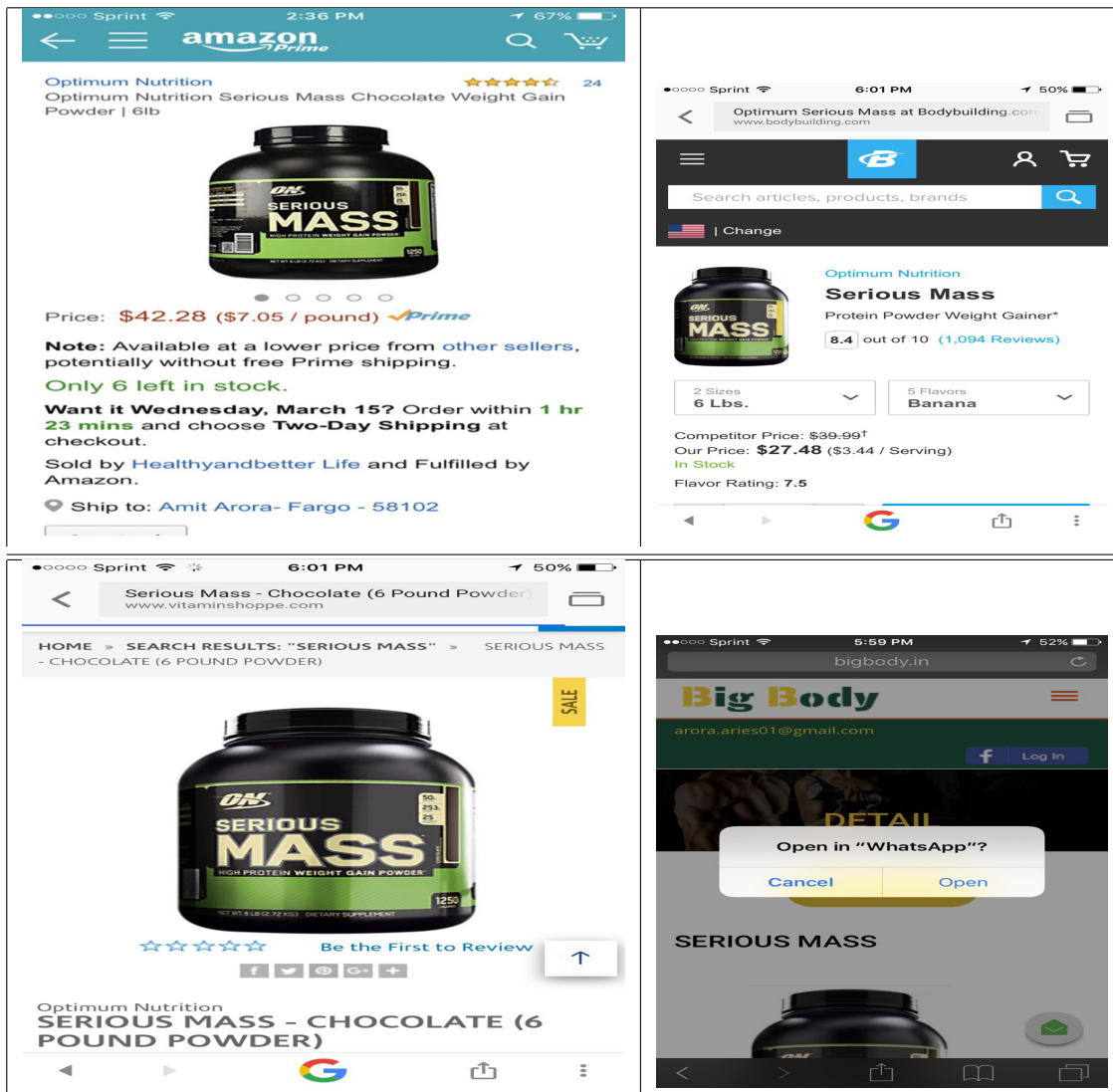


Fig. 2. Whatsapp Sharing Feature

2.1. APK (Android Application Package)

The number of mobile users today is greater than the number of desktop users. Most of us have known for a long time that people everywhere are increasingly accessing the Internet on a range of devices. With more and more visitors accessing your company website on mobile devices, it is important to make sure that all of your visitors have a positive experience, regardless of what type of device they're using to get there. Statistics show that the average American spends more than two hours a

day on his or her mobile device. The most important reason why you should consider building your own mobile app is customer loyalty.

With all the noise out there roadside banners, billboards, flashing signs, newspaper ads, flyers, coupons, websites, website banners, Facebook ads, and email marketing we slowly lose our impact on customers because of the immense amount of advertising surrounding us all. Its time to go back to making a true and sincere connection with your customers, and making them a loyal lover of your product and/or service. It can be a way of staying closer to your customers, and being just a fingertip away at all times [7].

2.2. E-commerce Potential

Worldwide, ecommerce is expected to grow by as much as 13 to 25 percent. Projections from eMarketer are showing rapid worldwide ecommerce growth through 2018. This year is expected to peak at nearly \$1.6 trillion and by the end of 2018, almost \$2.5 trillion. In the U.S. alone, ecommerce growth is anticipated to be somewhere between 11.6 and 16.5 percent from 2013 to 2018 [13]. Being an ecommerce platform in progress itself, bigbody.in also has the potential to gain a slice of this market with its standard run of the mill parts, and novel features of instant price comparison's, and WhatsApp share.

An APK file is the file format used for installing software on the Android operating system [8]. Just like Windows (PC) systems use an .exe file for installing software, Android does the same. Because of the time constraints, I could not create a full fledged mobile application but instead I have provisioned to provide the users a feature that allows the Big Body website to be down-loadable as an application. It will simulate the website as a mobile phone application with the caveat of not having the extra functionalities like push notification etc. Android users will have this feature so that they dont need to open the browser and type the website name each time.

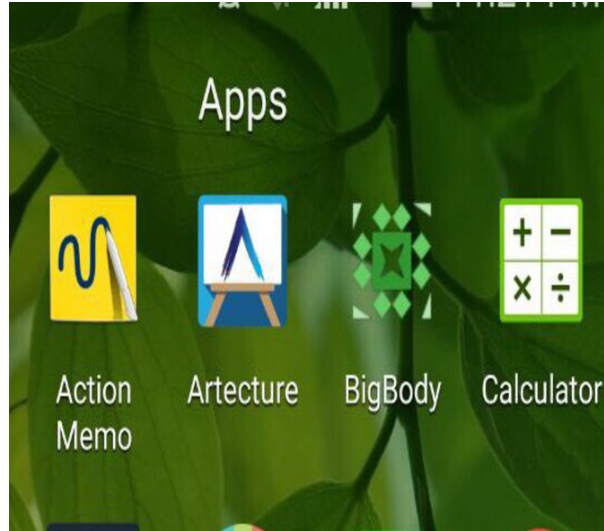


Fig. 3. Android Application Package for Big Body

This will give the users an experience of using the website as an application. Figure 3 visually depicts the APK feature.

2.3. Choice of Technology: PHP and MySQL

Being open source, PHP coupled with MySQL has grown leaps and bounds in adoption. PHP allows the user to generate dynamically generated web pages very quickly. Their primary adopters of these technologies are usually the small and medium sized business [9]. According to extensive and reliable web technology surveys the share of PHP as Server Side Language is more than 80% [10]. Figure 4 depicts the market penetration of popular server side scripting languages.

The most important reason for choosing PHP for bigbody.in is the time constraint at hand and ability of PHP to combine the business and presentation logic at the same place. Since bigbody.in is a relatively small scale data driven website, separation of business and presentation logic, though beneficial, was not deemed to be an integral part of this work. Moreover, quick development and turn around time was what we were looking for, and PHP-MySQL combination provided us that leverage. Moreover, quick customized and bundled PHP-MySQL setups are available

© W3Techs.com	usage	change since 1 March 2017
1. PHP	82.7%	+0.2%
2. ASP.NET	15.1%	-0.1%
3. Java	2.6%	-0.1%
4. static files	1.5%	
5. ColdFusion	0.6%	

percentages of sites

Fig. 4. Most Popular Scripting Languages (2017)

easily. For example, WAMP (Windows Apache Mysql PHP) is freely available at [11], and LAMP (Linux Apache Mysql PHP) is available at [12].

Other technology options that we explored were JAVA-Oracle but it required an elaborate setup. So we decided against it.

CHAPTER 3. SYSTEM MODULES

The Big Body platform is designed as a modular system for the ease of future expansion. Figure 5 shows the primary modules of the system and the following subsections explain each module in some detail.

3.1. Home/About Us

The Big Body home page gives an idea about what the website is all about. Since the Big Body website is about building your body through guided training and consuming the right kind of products, the home page has a set of features that introduce the user to the website. Given below is a list of features and the information displayed on the home page:

- The top of the page displays the contact information of the owner of the business.
- Another feature at the top of the page is the Facebook login button. If the user clicks on this button, he is redirected to the Facebook page of the Big Body system.
- Next displayed are the tabs on the top of the home page. These tabs are home, About, By Type, By Brands, By Ingredient, Contact and Blogs. These tabs are different modules in the Big Body system. A detailed discussion of each module is given in the paper.
- Next is a few images relating to body building sliding from left to right. These visuals are for the users to understand what this website related to.
- Next feature is all about fitness area with links to expert articles to help the visitors and users to know more about body building and how to proceed further in this sport.

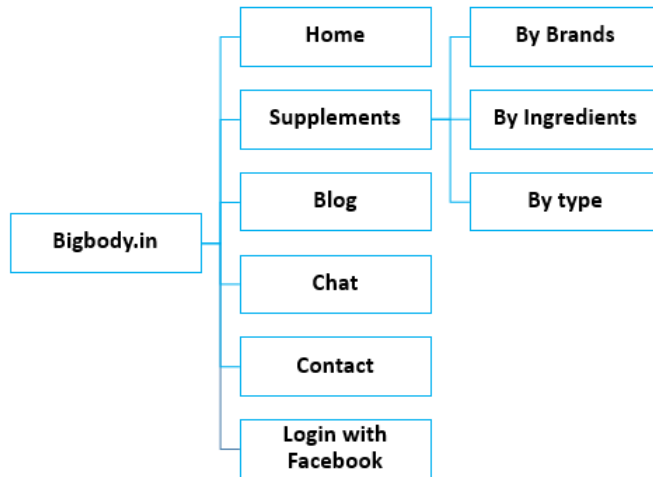


Fig. 5. A Simplified Modular Diagram for the Big Body platform

- Next section on the home page displays the featured products for the users. These are the products that are either very popular or the product that different sellers want to promote.
- Another feature on all the pages including the home page is the search functionality in the form of a search bar on the top right of the pages. The user can type any keyword to search for the stuff the user is looking for. It could be a product, an ingredient, a brand etc.

3.2. By Type

Body building supplements are classified into three different categories in this project: By type, By Brands and By Ingredient. In the first category By Type, the supplements are further classified according to the kind of supplement a person requires according to the nature of his body. The different subcategories are: Weight Gainers, Fat Burners, Proteins, Aminos etc. Weight gainers are for the people who need to gain weight for bodybuilding.

Conversely, fat burners are the supplements that are used by people who need to lose fat while following a body building regime. Others could be people who don't have enough protein in their bodies, these people would need supplements that are a source of proteins etc.

Once the user clicks on by type, these different sub-categories in the form of a list appear. Once the user clicks on a specific option, the user is redirected to the web page that display all the related supplements. A user can select a product and view its description. The user can also write reviews about the product on the website. Once the user enters name, email, review and clicks submits, the information goes to the administrator. If the comment is appropriate and relevant, the administrator posts the comment on the website. That way, the user can see only the reviews that are approved by the administrator.

Another feature that has been added to the website is sorting. As explained previously, once the user clicks on Bytype and then selects a sub category, the products under that category are displayed on the page. Now, there is a sorting feature in the form of a drop down on the right side that allows the user to sort in three different ways: default sorting, lowest to highest and highest to lowest. If the user selects default sorting, the products are displayed the order of their names. If the user selects highest to lowest, the products are displayed in descending order of price and vice-versa happens if the user selects lowest to highest option.

The next feature incorporated in the website is price comparison. This option is generally not found on other websites. Once the user selects a product, the price listed on other websites are shown along with the whole description and price of the product on our website. That way the user can know what price is listed on each website and choose to buy the product from whatever website the user wants to. In the big body system, the price comparisons are shown with that of Amazon and

theVitaminShoppe. We can include prices from other websites too as a part of future work.

Another feature is the Share on Whatsapp feature. This is displayed under every product on the website. The user can share the link to a product being viewed with others using Whatsapp application which is a messaging application for smartphones. This functionality is not available on other well known similar websites. If the user is viewing a product in his phone and the user clicks on the Whatsapp icon, the user will be shown with a link that they can share with other people in his contact list on Whatsapp. If the party receiving the link in the message clicks on the link, they will be redirected to same page on the big body website on which the product is displayed.

3.3. By Brands

The next type of category is By Brand. This displays all the brands available on the website. The number of brands available on the website are limited for now but the database for these products can be extended to accommodate more products and brands if the website is used for commercial purposes. The brands listed in the website are: Dymatize, Muscle Pharma, Optimum Nutrition and Arnold Schwarzenegger.

Once the user clicks on “By Brands” on the top left of any web page, the user is presented with the list of brands available on the website. When the user clicks on any brand, they are redirected to a web page displaying all the products under that brand.

User can write a review for the products in this category too. In that way the review functionality is the same across all categories of products(By Type, By Brands, By Ingredients). The sorting, price comparison and share on Whatsapp functionalities are incorporated in this category too.

3.4. By Ingredients

The third type of category is By Ingredients. Some people are very conscious about the ingredients a supplement is composed of and not just what a supplement helps achieve. So, users can select and buy products based on the ingredients a product is composed of. The ingredients are again limited to CLA, Caffeine, Glutamine and L-Carnitine. This is one of the functionalities that is not commonly found on other website. Having a user being able to choose a product based on the the kind of ingredients that suit them could be a very helpful feature.

Once the user clicks on “By Ingredients” on the top left of any web page, the user is presented with the list of ingredients available on the website. When the user clicks on any brand, they are redirected to a web page displaying all the products under that ingredient. User can write a review for the products in this category too. In that way the review functionality is the same across all categories of products(By Type, By Brands, By Ingredients). The sorting, price comparison and share on Whatsapp functionalities are incorporates in this category too.

The review, sorting, price comparison and share on Whatsapp functionalities are the same in this in this category too.

3.5. Contact

The “Contact Us” page has the contact information about the website. It lists the Postal Address, phone number to reach out to and the email ID. This information is for the users who have any questions or inquires about the products and body building in general.

3.6. Blog

Another feature added to the Big Body system is blogging. The blog is called Big Body Blog. This blog page has all the blogs written by the admin. To access the blogs listed in the website, there is a button on the right clicking on which displays

all the blogs' names in a list. The user can select a blog to read. Once the user opens a blog, the user can write their comments/reviews about the blog. The user is asked his name, email and comment once the user clicks on "Leave a Reply". The email id is asked to recommend the similar types of articles or blogs to the user. The user can also write his blog on the website. This feature is still under progress

3.7. Chat with Us

Another very important functionality is the Chat option. This is the online chat option available to the user using which the user can reach out to a customer representative right away. The app used for this purpose is TawkTo which is a messaging app that lets you chat with visitors on your website and monitor these chats. This is a way for the user to ask any questions or queries about a product or orders in real time. The customer representative can answer their questions at the same time without having the user to wait for a reply if email or phone is used.

The chat functionality in the Big Body system is displayed on the bottom right of every page as a message box. The user is asked for his name, email and question that the user can enter three different text boxes. Once the user enters this information , she is asked to submit and then the next available customer representative can respond back with the reply to the question.

3.8. Login using Facebook

Another functionality in the system is Facebook(an online social networking site) Login. The user can login to the Big Body website by clicking on the fb login button located on top right corner of each page. Once the user clicks on this button, the login request with login credentials is sent to Facebook. If the credentials are valid, the user is logged into the website. The user can also be redirected to the Facebook website. The default page that opens is the Big Body page on Facebook. Another functionality that could be added here is that the user can visit our Facebook page

and follow us for the updates and offers. That way the user could know the recent updates and offers on the website while they are surfing their Facebook accounts.

CHAPTER 4. TECHNOLOGY/PLATFORM OVERVIEW

4.1. Introduction to PHP Mysql

As mentioned previously, PHP-MySQL technology was used to build this website. PHP which was earlier called Personal Home Page is a server side scripting language that is very popular for developing web pages. What follows is a list of primary characteristics of PHP:

- PHP is an open source, server side i.e. the code is executed on the server-side and free scripting language.
- It can be used to create dynamic web pages.
- It can also be embedded into a regular html page.
- It is used in conjunction with a MySQL database to create web pages.

4.2. Lineage of PHP

PHP was created in 1994 by Rasmus Lerdorf. The very first product was called PHP/FI(Personal Home Page). It was a simple scripting platform called with a simple set of binaries called CGI(Common Gateway Interface). These binaries were write in C programming language then. PHP now is Hypertext Preprocessor and is an alternative of Active Server Pages (ASP) technology by Microsoft.

Rasmus Lerdorf named this suite of scripts as "Personal Home Page Tools" since he originally used them for tracking who visited and how many visits per day for his online resume. Over time, he rewrote the suite to add more functionality. The new model with larger implementations was capable of interacting with databases and thus became a platform that the users could use to build dynamic web applications. In 1995, Rasmus made the source code for the tool available to the public, so the developers could use it according to their own requirements, improve the code and provide bug fixes in it.

MySQL as mentioned, is a Relational Database Management System (i.e it uses tables and relations) that is commonly used with PHP to build web applications. MySQL uses SQL(Structured Query Language) to communicate with the database objects(for data retrieval, update, deletion etc.). Following are a few characteristics of MySQL:

1. It is the most popular RDBMS used with PHP.
2. It is also open source and free like PHP.
3. We can develop just about any kind of small or large website using PHP-MySQL combination. E.g. from a small contact us form to a large enterprise portal.

4.3. Features of PHP

- **Open Source:** PHP is an open source scripting language, so there is no fee for licensing and the cost of use is minimal.
- **Easy to Learn:** Its is an easy to learn programming language in terms of following strict rules or standards like in other languages like java. It is easy to learn in terms of availability in hosting packages and the documentation available is vast which helps support the beginners in learning the language to a great extent.
- **Simplicity:** PHP is almost a very simple language. Beginners can start with simple scripting and then advance to writing object oriented code. Since PHP is intuitive, The easiest way is to scan down a sample php file, read everything and run it sequentially to see how every piece of code works. A standard php page consists of static markup and dynamic content embedded in the markup. It has a vast library of web tutorials and books.

- **Security:** PHP as a language is very secure. It is designed specifically to be a more secure language for writing CGI programs than Perl or C, and with correct selection of compile-time and runtime configuration options, and proper coding practices, it can give you exactly the combination of freedom and security you need. It is important keeping HTTP session management secure.

Session related security is described in Session Security section of Session module reference. As there are many different ways of utilizing PHP, there are many configuration options controlling its behavior. A large selection of options guarantees you can use PHP for a lot of purposes, but it also means there are combinations of these options and server configurations that result in an insecure setup. For the language itself, it is recommended that you use the latest stable build to keep on top of language-based security. The php maintainers are the ones that create and fix bugs.

- **Flexibility:** PHP is a very flexible language because it can be embedded in markup code and can be used to build very powerful solutions . The same PHP code can be rendered on computers as well as mobile devices. You can build highly appealing and interactive dynamic web pages. It can be embedded into HTML and can be used to build powerful web solutions that can be rendered well on mobile devices too.

Another feature that makes it a flexible language is that it is loosely typed which means that the parameters and variables can fit into different types based on the data defined on top of them. This type of flexibility is called code flexibility. Another type of flexibility is called configuration flexibility. It means that PHP can be used to build complete server applications, with all the power of a shell user, or in a tightly controlled environment.

- **Familiarity:** Another powerful feature of PHP is that it can interact with many different applications and database languages including MySQL. Both PHP and MySQL are open source and are compatible with an Apache server which is also open source or free to license. It can run on Windows, Linux and Unix servers.

4.4. Lineage of MySQL

MySQL was founded by a Swedish company named MySQL AB. The three engineers who created it are David Axmark, Allan Larsson and Michael Widenius. The development of MySQL began in 1994 and the first version of MySQL was out 23 May 1995[5]. MySQL database system was initially built for personal use. It was built from mSQL, which was too slow and inflexible. The creators of mSQL then created a new SQL interface while keeping the same API as mSQL. By keeping the API consistent with the mSQL system, many developers were able to use MySQL instead of the mSQL antecedent.

MySQL AB was acquired by Sun which was then taken over by Oracle Corporation. Currently, MySQL db is developed, updated and maintained by Oracle Corporation.

4.5. Features of MySQL

- **Open Source:** The main reason why MySQL has become popular in organizations is that it is open source which means that the code of the software is available and anyone can make changes to it according to their requirements. A free version of MySQL is available as well that is robust and can be used for small to mid size database applications. So, companies now-a-days prefer MySQL because they don't have to pay anything for the product.

- **Secure:** MySQL RDBMS is extremely secure and the data access is protected via database authentication. It provides mechanisms for ensuring that only authorized users have access to database servers. Unauthenticated users are blocked down to the client machine stage. It also provides SSH and SSL support. These passwords are stored in encrypted form which makes it further secure. It's highly unlikely to break these complex encryption algorithms. Finally, backup and recovery utilities provided through MySQL and third party software vendors allow for complete logical and physical backup as well as full and point-in-time recovery.
- **Portable:** MySQL is a cross platform DBMS system and can be run on a variety of platforms e.g. Windows, OS2, Linux and Solaris. The portability feature makes MySQL very suitable for the applications that involve multiple platforms esp. web applications. It supports almost all the major programming languages and can be easily integrated with the languages like PHP, Java, C, C++, Perl, C, Python etc.
- **Management Ease:** MySQL requires just requires an average time of 20 minutes from software download to installation on any platform(Windows, Mac etc.). It provides a complete suite of migration, export, import and Gui tools that allows DBAs and Developers to troubleshoot and manage the operations of the server.

MySQL has also a very large developer community and online document base because of being an open source product. The developer community releases regular patches and updates for MySQL. There is a lot of documentation and several database templates for different applications that have been developed and can be readily used and modified for rapid application development.

- **Scalability and Flexibility:** MySQL database server provides a lot of flexibility and scalability by supporting applications that have only a footprint of data to massive data warehousing applications. It supports all versions of Linux, UNIX, and Windows. The open source nature of MySQL allows complete customization for who want the database server to be customized according to their requirements.
- **24 x 7 Support:** MySQL has 24 x 7 support unlike any typical open source project that can't get the type of support any professional organization that uses that product expects. MySQL is owned by Oracle corporation and a goos support model is available that provides an open source product with a trusted software support.
- **Low Cost of Ownership:** Corporates are realizing a lot of cost savings by using MySQL in their project development which might otherwise raise to seven figures. Mysql also requires low cost commodity hardware which further contributes to far less cost than of those offered by other software vendors. In addition, the reliability and easy maintainability of MySQL means that database administrators don't waste time troubleshooting performance or downtime issues, but instead can concentrate on making a positive impact on higher level tasks that involve the business side of data.

4.6. Overview of HTML/CSS:

HTML stands for Hypertext Markup Language and is a standardized language for creating world wide web pages. HTML was created by Tim Berners-Lee in 1990. Since then it has gone through a series of revisions spanning over many years. HTML5 is the fifth and current version of HTML.

Here markup simply means that the language uses tags and attributes to define the structure and layout of a page. These tags along with required text are saved in an html file and then interpreted by an internet browser which further translates it into visual form.

CSS stands for "Cascading Style Sheet." For a web page, a Cascading style sheet may be used to format its layout. CSS basically aids the HTML in multitude of ways wherein defining the style of the text, the layout of the web page, tables and images in the web page and many other aspects of a web page that could only be defined in an HTML document previously, are a few of them. CSS helps in developing a uniform look across several pages of a whole Web site. In other words, it separates the style from content .

Once a style is defined in a CSS file, the same can be used over multiple elements in an HTML file. So, instead of defining a style for every element and block of text within a page's HTML, a CSS style need to be defined only once in a CSS file. This has an added advantage of centralizing the styles. A new style can be applied to the whole website by only changing the style in a CSS file [6]. Apart from style definition, CSS can also be employed for defining cell paddings, thickness, image paddings etc thereby proving a good amount of control over look and feel of the website.

4.7. Characteristics of HTML

HTML is relatively easy to learn, with the basics being accessible to most people in one sitting; and quite powerful in what it allows you to create. The current version of HTML i.e. HTML5 supports some fantastic characteristics. Prominent among them are:

- **Multimedia Support:** HTML5 has improved the support of both audio and video files that can be played in the browser.

- **Canvas Support:** HTML5 now supports pixel level operations which were missing in earlier versions.
- **Required fields:** HTML5 supports required field validation right in the input tag without the need for javascript to validate them.

CHAPTER 5. DESIGN AND IMPLEMENTATION

5.1. Introduction to the Software Model

A software development life cycle is the series of stages that a Software project undergoes during its lifetime. The very first stage in this life cycle is called the feasibility study stage during which it is determined if a project is feasible in terms of the resources available for the project. The next stages are requirements gathering, design, coding, testing and maintenance. A life cycle model for a software represents all the activities required to build a software product and the order in which these activities are to be undertaken. Various life cycle models are Classical Life Cycle Model, Waterfall model, Iterative model, Agile model etc. However, in any practical software development work, it is not possible to strictly follow any one model.

5.2. Data Model

Data models are used to define the logical structure of a database in an application. They are fundamental entities to define and project abstraction in a DBMS(The DBMS used to build the Big Body software is MySQL and the scripting language is PHP). They define how different data sets in a database(s) are connected to each other, how they are stored inside the system and what all operations can be performed on them. A data model can be divided into following two categories.

An Entity-Relationship (ER) Model represents real world entities and relationships among them. It is based on the notion of real-world entities. An ER Model creates entities which are real world objects, relationship set among those entities, attributes of those entities and constraints. It is used for the conceptual design of a database system.

An ER Model consists of: **Entities and their attributes** and **Relationships** among these entities.

Entity in an ER Model is a real-world object/entity having properties called attributes. For example, in a Sales database, a customer and a product are considered as entities. A customer has various attributes like name, email, postal address, etc. A product has attributes like product id, name, price etc. In our current data model for the Big Body application, the various entities involved are product, users, comments, reviews, product category etc. Every attribute for an entity is defined by its set of values called domain. For example, in case of the product category entity, the domain is limited to a set of three categories: by type, by brands, by ingredient.

Relationship is the logical association between two entities. Relationships are mapped with entities in various ways. There are basically 3 types of relationships between entities: one to one, one to many, many to many.

The second and most popular data model in DBMS is the Relational Model. It is more scientific model than the others. It is based on first-order predicate logic and defines a table as an n-ary relation.

The main characteristics of Relational model are:

1. Data is stored in tables called relations.
2. Relations can be normalized.
3. Each row in a table is called a tuple.
4. These relations can be normalized. The values stored in normalized relations are atomic i.e. the value in a given row for a given column can't be further divided.
5. Each column in a relation contains values from a same domain.

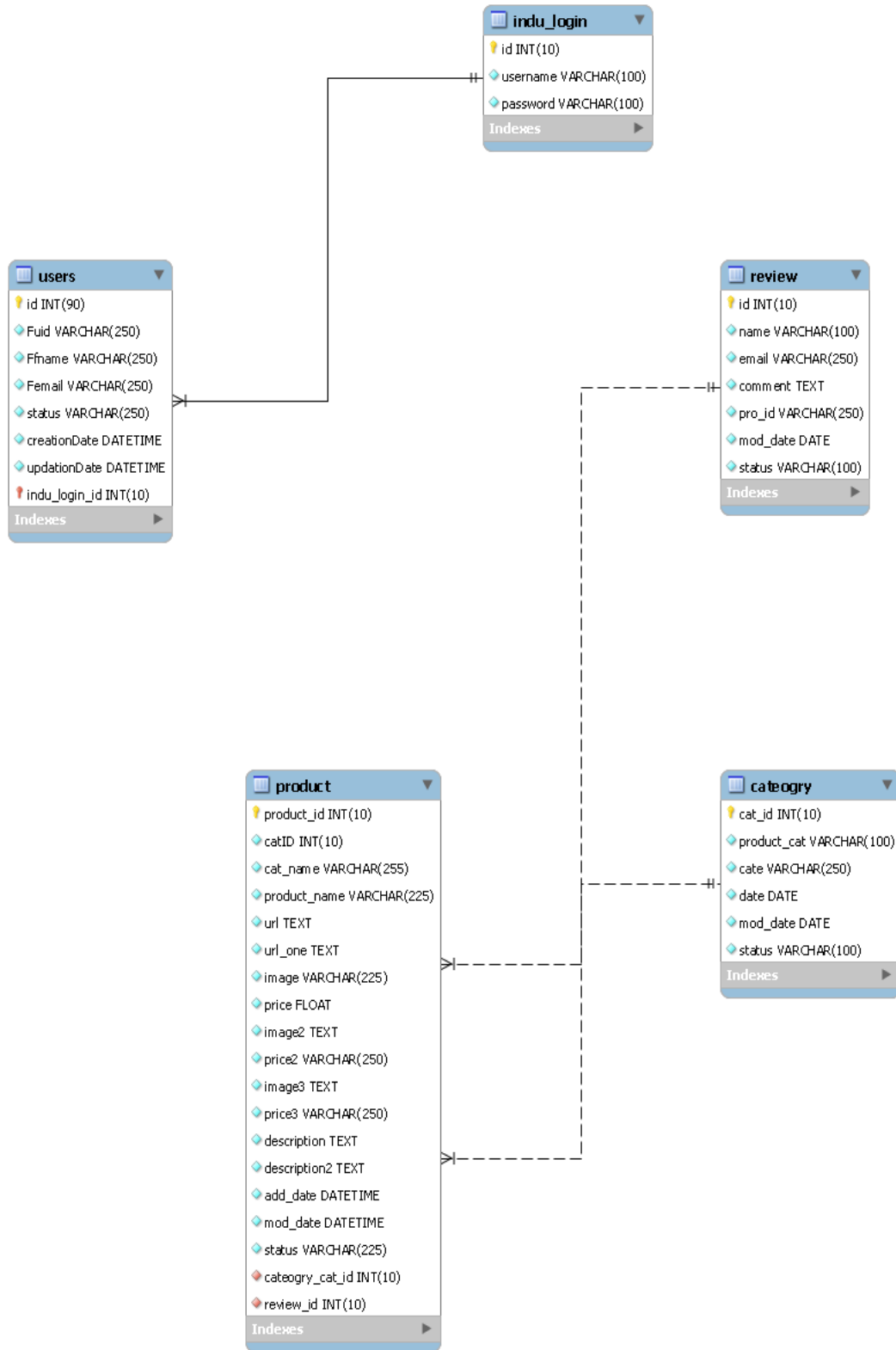


Fig. 6. A Simplified Relational Data Model for Big Body System

The relational data model of the Big body system is shown in the following figures. The first figure shows a simplified model of the database with all the basic entities and their relationships involved in the system. The second figure shows a detailed view of the model with the entities involved in the advanced features in the Big body system.

We also require some understanding on database schema before digging into the details of the database system of Big Body. A database schema is basically the skeleton structure that represents the logical view of the database. A schema defines how the data is organized, how the relations among the tables are associated and all the constraints that are to be applied on the data.

A database schema also represents the entities in a database and the relationship among them. It is the database designers who design the schema to help programmers and other users understand the database and make it useful.

5.3. Use Case Model

A Use Case diagram is a way to represent different functionalities associated with a software system. It describes a set of actions called use cases that a system can perform in collaboration with one or more external users of the system (actors). Use cases represent the different ways in which a system can be used by the users. A use case model can be documented by drawing use case diagrams and writing accompanying texts to elaborate the drawing. The two main elements of a use case diagram are : actors and use cases. An actor represents an entity that performs a certain action or the role in the system and a use case is a business functionality supported by the system. In the use case diagram, each use case is represented by an ellipse with the name of the use case written there. Following is a possible use case diagram for the Big Body e-commerce system.

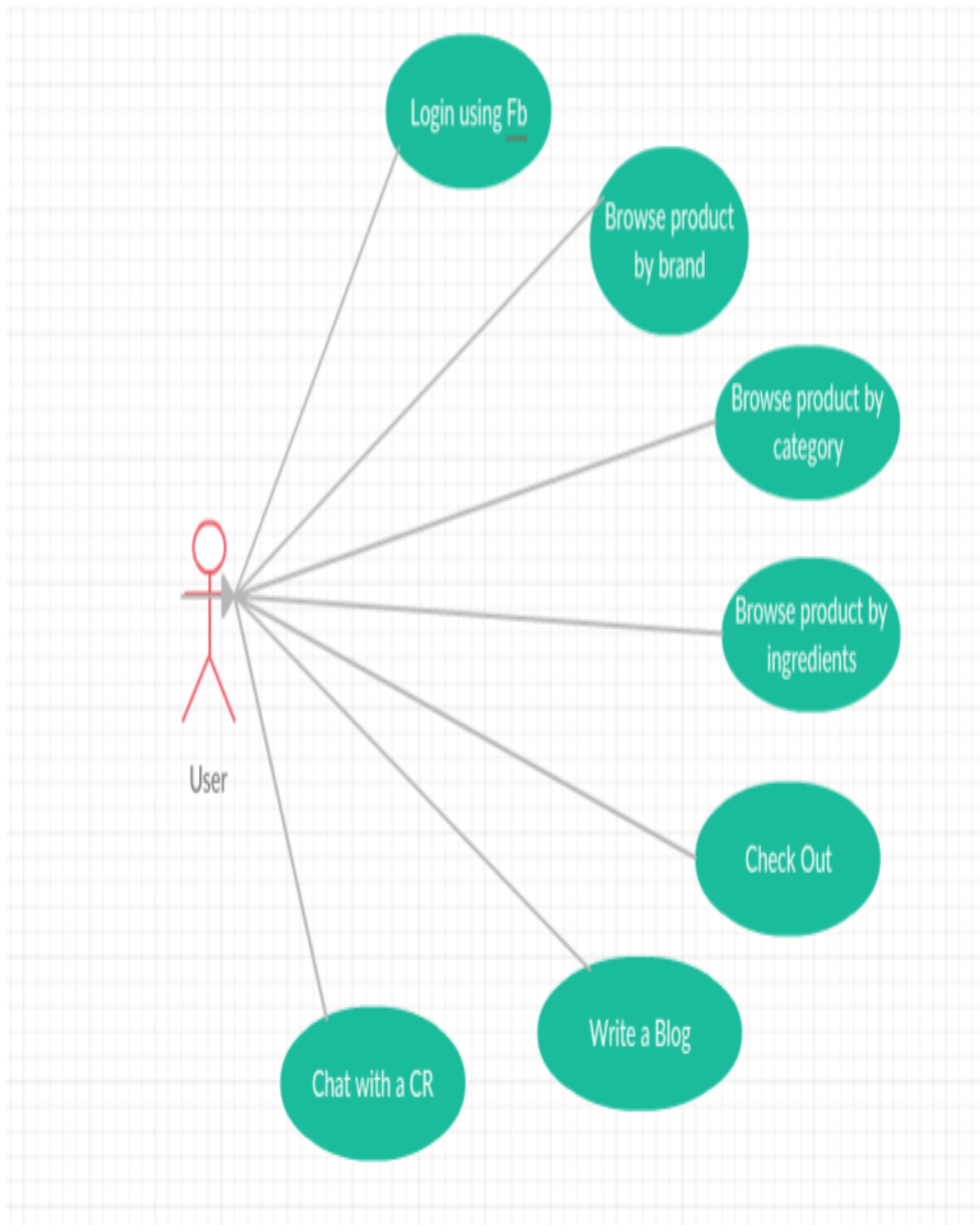


Fig. 8. A Simplified Use Case Diagram of Big Body System

Figure 8 shows a very simplified use case diagram of the Big Body system. It basically shows one actor who is the User of the system and the basic functionalities that are a part or potentially could be a part of the Big Body website in the form of use cases(the oval shapes are use cases). There are login using Facebook, browse products by three different types(brand, ingredients and category) , check out if the user wants to buy a product(s), blogging functionality and chat with a customer representative. The detailed diagram is given in the next figure.

Figure 9 shows a detailed use case diagram of the Big Body system. There are two actors, the customer and the facebook authentication system. The first use case shown is Login using Facebook. The user tries to login to the system using Facebook Authentication. The request is processed by the Facebook Authentication system. The next use cases are for browsing the products by three different categories as mentioned and updating the cart with the products that the user wants to buy followed by the check out functionality that has not been implemented as a part of th website yet but can be incorporated as a part of the future work. The next use case is for blogging. Its detailed diagram is given in one of the figures later in this paper. The last functionality is connecting with a customer representative if a user has any doubts or question. This is also explained with help of a different use case diagram in this section.

Figure 10 shows the Browsing Products functionality in the form of a use case diagram. The check out functionality and buy product use case have not been implemented in the website yet but can be done as a part of future work. The two actors are Customer and Facebook Authentication System. The Customer can browse product by ingredient, by brand or by category.If the user likes a product and wants to buy it they can add it to their shopping cart. The user can also come back and write a review about the product. The user can then use the checkout feature in

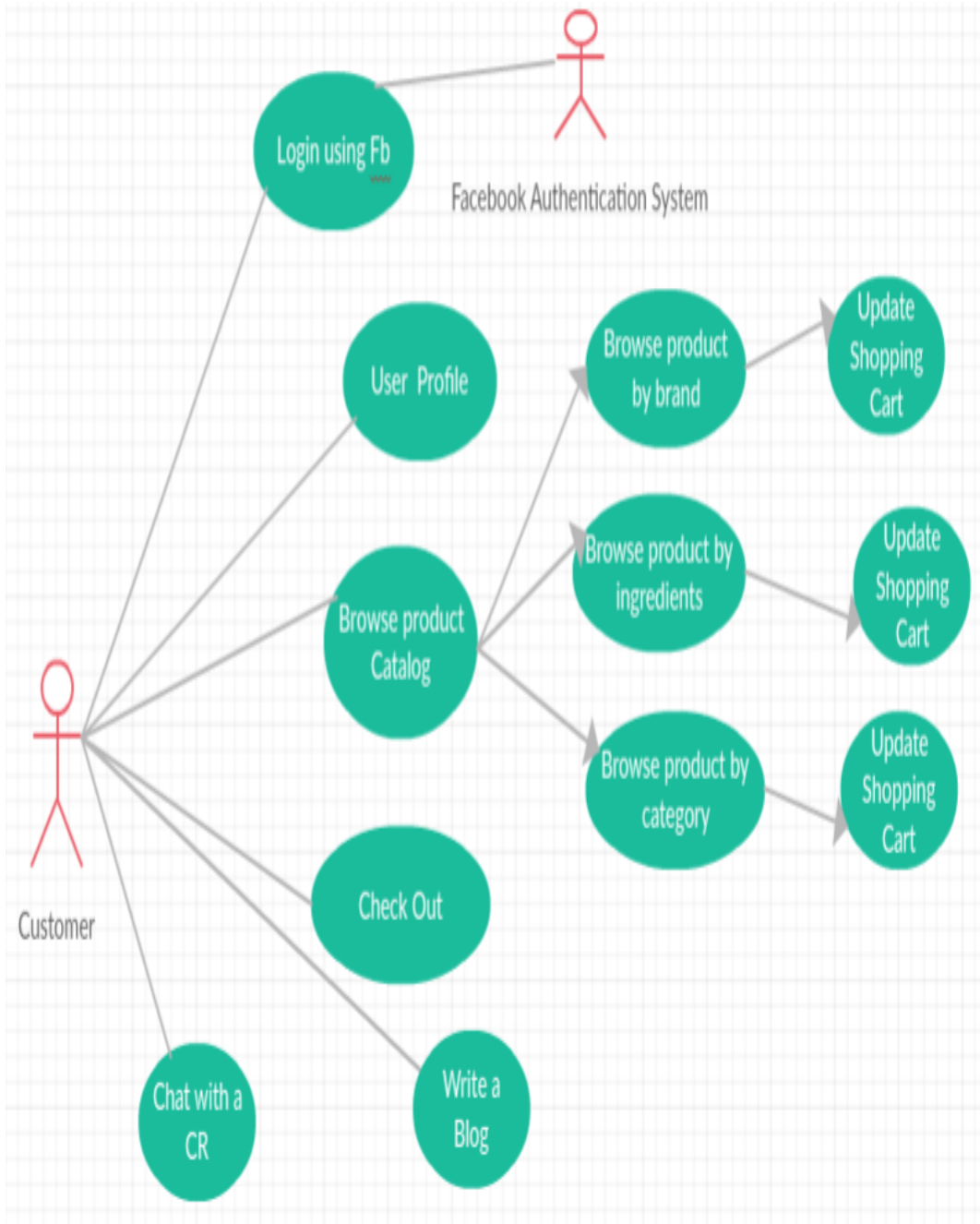


Fig. 9. A Detailed Use Case Diagram of Big Body System

the end to buy the product. Figure 11 shows the blogging functionality in the form of a use case diagram. It shows a possible blogging system that can be incorporated in Big Body system. The two actors are User and Admin. The user can input a new blog, edit the blog or delete the blog. Once the user enters blog, it is submitted to the Admin for review and approval. The user can also view and read another user's blogs and write a comment/ reply.

Figure 12 shows the chat functionality in the form of a use case diagram. There are two actors: user and customer representative, and two use cases as shown. If the user has any questions, the user can enter her name, email address and the question. Once the user enters this information, it goes to the CR interface. The next customer representative responds with a solution to their query.

5.4. Android Application Package

Android application package (APK) is the package file format used by the Android operating system for distribution and installation of mobile apps. One of the features of this website is that it can be downloaded as an application. Its not on google play yet. But I have created the APK file of the website which can be listed on google play late so that user will be able to download it. It will open in browser but it will look like an application with its logo. An advantage of this setting is that the the user does not need to open the browser and type the website address. It will be stored on their home screen as an application.

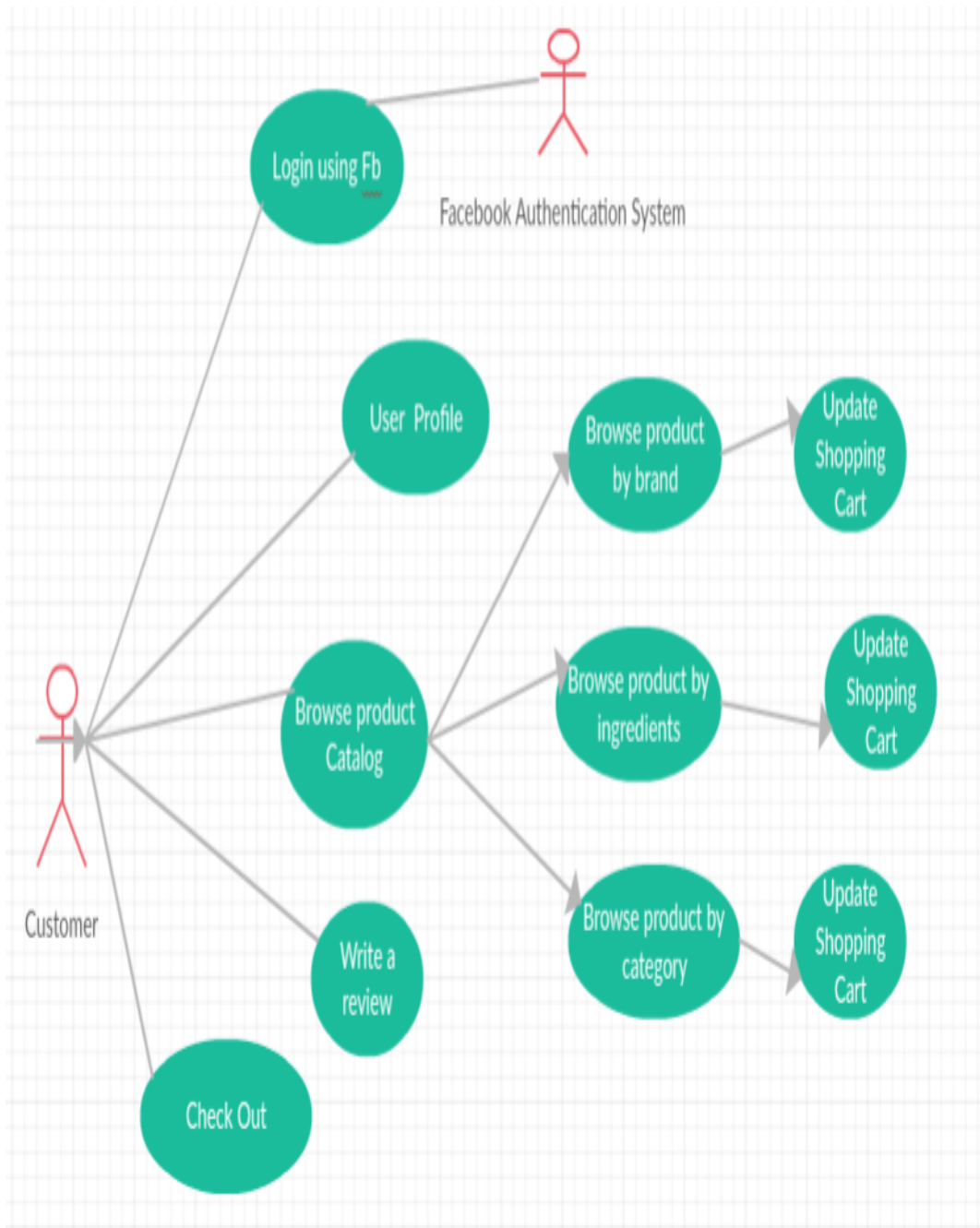


Fig. 10. Use Case Diagram for Browsing Products

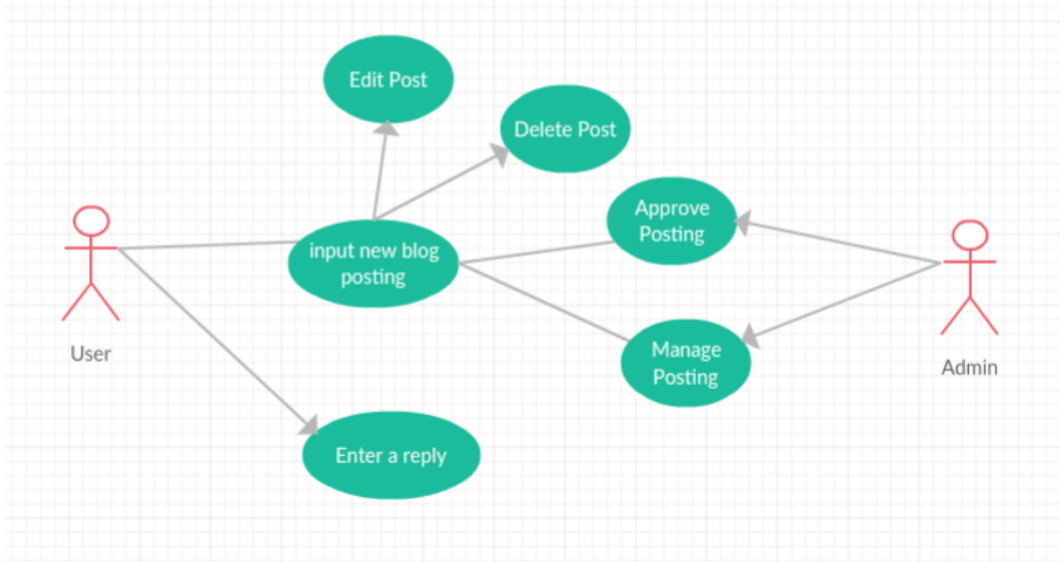


Fig. 11. Use Case Diagram for Blogging

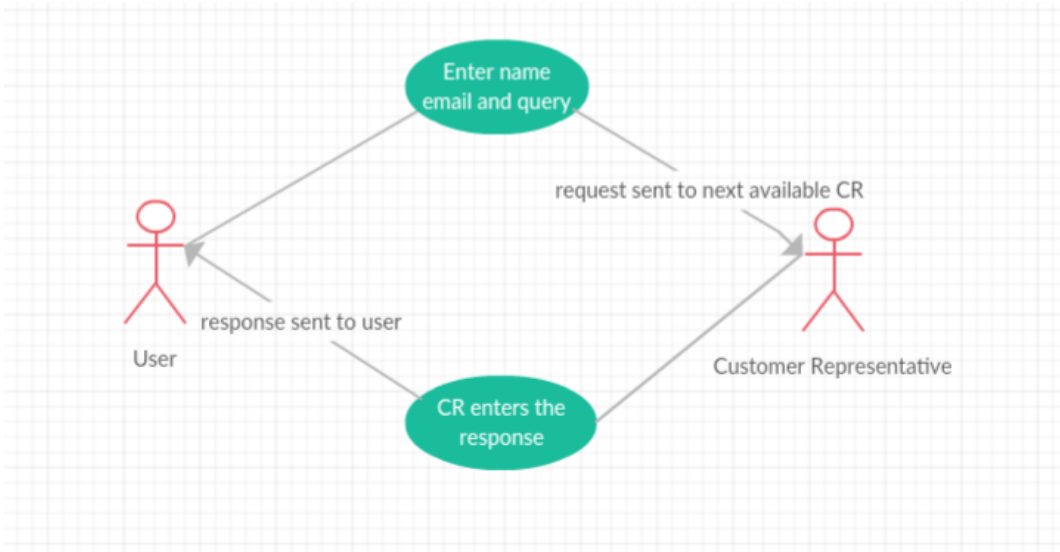


Fig. 12. Use Case Diagram for Chat Functionality

CHAPTER 6. CONCLUSION AND FUTURE WORK

In conclusion, the Big Body tool in the form of an e-commerce website can help a person interested in bodybuilding in choosing the right kind of body building products, take the experts opinion, and access valuable articles/blogs that would help them move in the right direction. The price comparison of a product with other websites and sharing a product's details directly on Whatsapp are new features not found on similar websites.

The Big Body website can be further developed as a full fledged tool to guide people towards building their bodies in an optimal manner. In addition to selling body building products by type, brand and ingredients, the tool can recommended to people the kind of supplement they should consume for their optimal health on the basis of the parameters that a user will input like weight, height, BMI, and blood glucose. A recommendation system can be built as a part of the web application to achieve this.

To improve the functionality and features of the website, customer surveys and constant feedback section can be incorporated. This would help create a strong mechanism for flow of new ideas which I believe is an important part of improvement of any product.s

Another functionality that can be added to the software that helps a subscriber to choose their bodybuilding coach online based on their background, experience and rating and buy their programs, materials, tutorials etc. This would help a person to receive guidance on what steps to follow right on their computer without having to go to a specific location. Apart from that, a login module can be added wherein users can maintain their own accounts. The website can be enhanced by adding exercise videos of specific body parts which can be complemented with scientific information on other form of exercises like Yoga etc.

A full fledged mobile version of the web application can be developed that can be used by people anywhere with a few clicks. The mobile application can have all the functionalities mentioned above and much. One utility that can be added to the mobile application version of the Big Body tool would keep track of one's physical activity in terms of how many sets of weight lifting, running or other physical activity a person should do on a day based on their body structure and what more needs to be done for the day. That way it could act as a bodybuilding tracker tool.

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