

## Software Development Life cycle Design Specification

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## **1 Introduction**

### **1.1 Purpose of this Document**

This should provide everything designers, programmers and testers need to know to use the facilities provided by a module. It should include an outline for all parts of the system. The information provide should be enough to get a basic understanding of the system.

### **1.2 Scope**

An outline for each class and its containing methods. Explanation of how the server works and significant algorithms. Outline of how the system is navigated and operated through sequence diagrams.

### **1.3 Objectives**

The objective of this document is to give an overview of the system that is being produced.

The areas covered by this plan are:

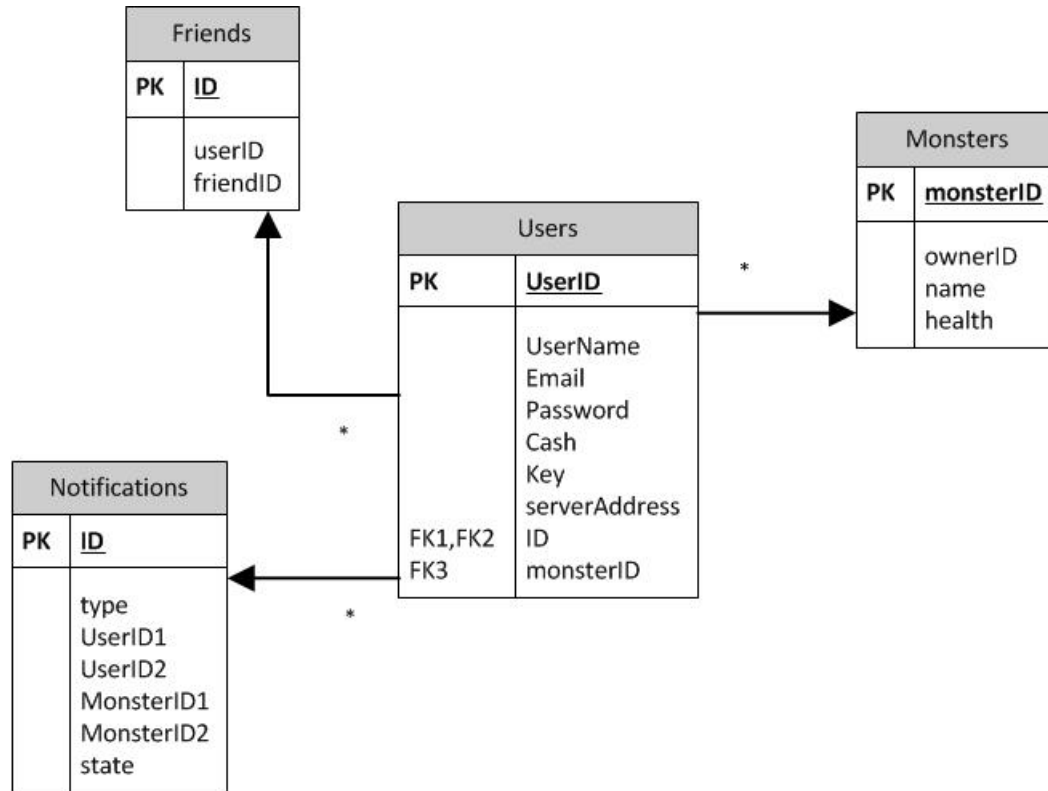
- Java Classes explanations
- Sequence diagrams
- Relational Database diagram
- JSON Table
- Algorithms

## **2 General Functionality**

### **2.1 Description**

An HTTP servlet is used to access the data contained within the backend of the server as if it was almost a web page. We will pass parameters between it and get a response. We will be working on the principle that one main servlet will perform different actions, passing through an actions variable and any data required to be processed. There are two methods of accessing this; using get and post requests. The get request will pass the parameters through the URL, the post request through a hidden layer, based on the users input. JavaScript will collate the necessary data, and attach the appropriate action command before sending to the server.

## 2.2 Relational Database diagram



## 2.3 Relational Database diagram explanation

This is a relational database diagram for our database, we have used 4 tables to store information about the User, the Users table to store information directly related e.g. user name etc. We then have the Monsters table in which will have information about the users monsters, the friends table to store the users friends and the notifications table to store information about any notification the user might have e.g. a user who wants to battle their monster with you.

## 3 Algorithms

The algorithm for the aging process and strengths as follows:

$$=(10+2.7*A)*EXP((A*(-0.09)))$$

The A is the number of days that have passed. Upon birth it is at 100% health, after 7 days it rises to 150%. After 21 days(3 weeks) it's back to 100% and at 84 days(12 weeks) the monster shall be at 0%(Dead).

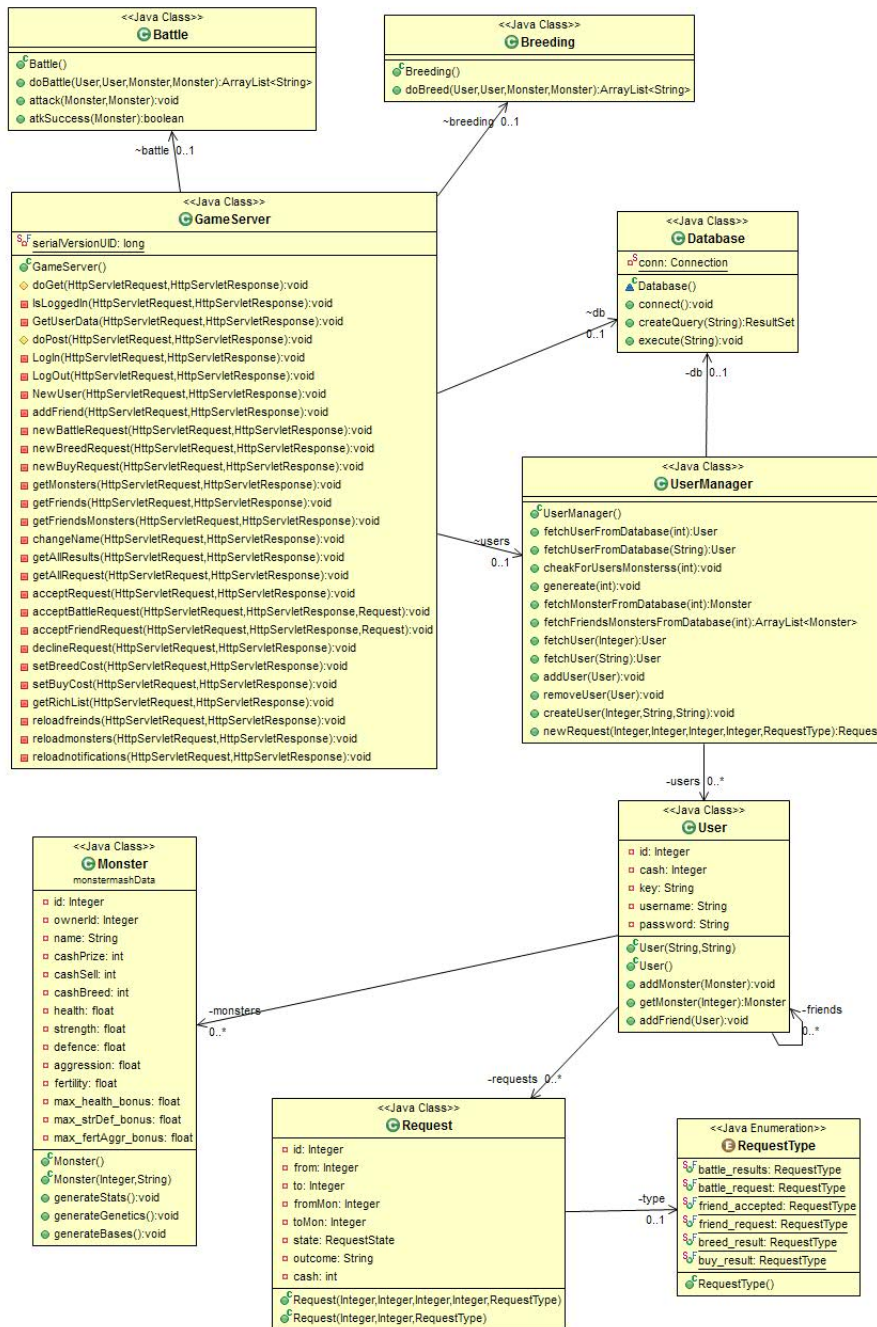
#### 4 JSON Table

Page	Event	Description	Action	Data	Response
Profile	On Load	Request a list of the users monsters	getMonsters	N/a	N/a
Battle	On Load	Request a list of users monsters and a list of the users friends	getMonsters,getFriends	N/a	N/a
Battle	On clicking a friend	Request a list of a friends monsters	getFriendsMonsters	friendId : Int	ID representing a friend.
Battle	On clicking battle	Create a new battle request	newBattleRequest	userMonsterID:Int, friendId:Int, monsterId:int	ID of the selected monster, ID of the friend we are battling with, ID of our friends monster
Breed	On Load	Request a list of users monsters and a list of the users friends	getMonsters,getFriends	N/a	N/a
Breed	On clicking a friend	Request a list of friends monsters	getFriendsMonsters	friendId:Int	ID representing a friend
Breed	On clicking Breed	newBreedRequest	userMonsterID:Int, friendId:Int, monsterId:Int	ID of the selected monster, ID of the friend we are breeding with, ID of our friends monster	N/a
Friends	On Load	Request a list of friends	getFriends	N/a	N/a
Friends	On Load	Request a list of pending friends	getAllNotifications	N/a	N/a
Friends	Accept Friend Click	Accept a pending friend request	acceptRequest id: Int	ID representing a friend	N/a
Friends	Decline Friend Click	Decline a pending friend request	declineRequest id:Int	ID representing a friend	N/a
Friends	Add Friend Click	Send a request to connect to another user as a friend	addFriend	username: email	The users email address
Notifications Menu	On Load	Request a list of all notifications for the current user	getAllNotifications	N/a	"Notifications": [ "Type": "BATTLE", "ID": "1", "From": "email", "Type": "BREED", "ID": "2", "From": "email", "Type": "FRIEND", "ID": "3", "From": "email", ] Type can be BATTLE BREED or FRIEND
Notifications Menu	Click accept request	Accept the notification	acceptRequest	id :Int	ID of the notification
Notifications Menu	Click decline request	Decline the notification	declineRequest	Id :Int	ID of the notification

## **4.1 JSON Explanation**

JSON (also known as JavaScript Object Notation) is a form of data interchange that is designed to be "human readable". Derived from the JavaScript scripting language, it shows simple data structures and associative arrays, which they call "objects". This table shows us the various data interchanges that take place within the design of our project. JSON is used as an alternative to XML.

## 5 Class Diagram





## **6 Significant Data Classes**

### **6.1 Java Data Classes**

There are four main classes within the Java designed to be implemented within the project, these are Monster, User, User-Manager, and Request.

### **6.2 User-Manager class**

The User-Manager class handles many different tasks related to how each of the User profiles are created and organised. This class has created the ability to add and remove a user from a database, this can be seen in the "addUser" and "removeUser" methods located within the class. This class can also perform other tasks that are important to the functionality of the system, such as the ability to fetch particular User data, which can either be the Users ID, or the Users name (as depicted by a String). Without this class, it would be impossible to create a usable log in page, as the system would not be able to get (fetch) the data that is stored in the database to validate their log in. This class would be absolutely necessary for a functioning registration form for the new users, as without it, no Users could be added to the system.

### **6.3 User class**

The User class handles the more specific information appropriate each user that is registered to the system. This includes information such as the Username and password of each of the registered Users. But this is not all this class holds. The User Class also holds details that are necessary for the management of the user within the game. This includes a method to get how many monsters the User owns, and another method which calculates how much cash the User owns. This class also contains information on which Server the User is registered to, without this method within this class, the game would simply not work, as the online features, such as the battling, mating and friend requests would not know where to look for the other users also wanting to play Monster Mash.

### **6.4 Monster class**

The Monster class will handle all of the functionality regarding monsters that the registered Users may own. This can include many basic things, such as how many battles the monster has won or lost, which User owns the monster, the name of the monster and its birthday. However, other more complex stats of the monster will be included within the MonsterStats class, this includes personality attributes, such as

how aggressive each particular monster is, and also includes the battle statistics (the health, attack power and the defensive power of each monster). This MonsterStats class will also contain the fertility rate of each monster, which will be important in the breeding stage of the game. The idea behind splitting the information between each of the classes, is for added simplicity when coding, it would have been a shame not to include extra features such as the age of each of the monsters, as these extra stats add greater depth to the game.

## 6.5 Request class

The Request class, as the name would suggest, handles the various requests that each of the registered Users will send to each other while playing the game, these include the options to be able to fight and breed with another Users monsters, and also the ability to become friends with another registered User. Aside from these requests, this class also deals with the notification feature we are implementing within our game, this class will be able to tell the User from these notifications what sort of request another User has sent to them, who has sent it, and the ability to respond to the request.

## 6.6 Functional Requirements

Monster	FR3, FR4, FR10
User	FR1, FR6, FR7, FR8, F11
User-Manager	FR1, FR2, FR3, FR7
Request	FR6, FR9

Table 1: This table shows the functional of Java classes

## 7 Breed Class

The Breed class is a Private class that deals with the breeding process of the particular User monsters that are in question. The name of this class is Breed.class. There is an ENUM and it is also the only Public Method located within this class, this ENUM has no parameters. The Breed class is basically a set list of monster types that will be able to breed. We used ENUM so that you can only select a type from that particular list.

### 7.1 Public Methods

The only public method this class has is ENUM Breed and has no parameters. This is a list of set monster types that the monster will be of type. Used ENUM so can

only select a type from that list.

## **8 Monster Class**

The Monster class is named `Monster.class` and is a public class. This class contains getters and setters for the monsters attributes. These methods can set and get attributes such as the ID of the monster, the owners (the Users) ID, the name of the monster, the stats of the monster (which include attributes such as the attack, the defence and the aggression of the monster), the breed of the monster, the status of the monster, the cash prize that would be attained by defeating the particular monster and finally the wins and losses each monster has achieved. These methods will set the value for each of these, and will be able to return the value for the monster.

### **8.1 Public Methods**

This class contains getter and setters for monster attributes. The getters and setters are for `id`, `ownerId`, `name`, `stats`, `breed`, `status`, `birth`, `cashPrize`, `wins` and `losses`. They set the value and return the value for the monster.

## **9 MySQLDatabase Class**

The `MySQLDatabase` class is called `MySQLDatabase.class` and is a public class. The `MySQLDatabase` doesn't contain any public methods. The `MySQLDatabase` class's goal is to manage the data in our relational database system. This class will store all the information that is important to each particular User. This includes the Username and Password of each of the Users, the monsters they own, and what friends they are with. Without this class the game would simply break, as there would be nowhere to store and retrieve the relevant information for the User.

### **9.1 Public Methods**

`public User getFrom()` - This will return from which is of type User. `public void setFrom(User from)` - This will set the User from and take User from as a parameter. `public User getTo()` - This will return to which is of type User. `public void setTo(User to)` - This will set the User to value and take User to as a parameter. `public Monster getFromMon()` - This will return fromMon which is of type Monster. `public void setFromMon(Monster fromMon)` - This will set fromMon and takes Monster fromMon as a parameter. `public Monster getToMon()` - This will return a toMon which is of type Monster. `public void setToMon(Monster toMon)` - This will set

toMon and takes Monster toMon as a parameter. public RequestType getType() - This will return type which is of type request. public void setType(RequestType type) - This will set type and take RequestType type as a parameter. These will be used to determine whether it is pending, accepted and declined. public RequestState getState() - This will return state which is of type RequestState. public void setState(RequestState state) - This will set state which is of type RequestState and takes RequestState state as a parameter.

## **10 UserManager**

The User-Manager class handles many different tasks related to how each of the User profiles are created and organised. This class has created the ability to add and remove a user from a database, this can be seen in the "addUser" and "removeUser" methods located within the class. This class can also perform other tasks that are important to the functionality of the system, such as the ability to fetch particular User data, which can either be the Users ID, or the Users name (as depicted by a String). Without this class, it would be impossible to create a usable log in page, as the system would not be able to get (fetch) the data that is stored in the database to validate their log in. This class would be absolutely necessary for a functioning registration form for the new users, as without it, no Users could be added to the system.

### **10.1 Public Methods**

public UserManager() - public User fetchUser(Integer id) public User getUser(String name) public void addUser(User user) public void removeUser(User user) public void createUser(Integer id, String username, String email, String password)

### **10.2 Public Methods**

public Integer getId() - This will return id which is of type Integer. public void setId(Integer id) - This will set id and takes Integer id as a parameter. public String getUsername() - This will return username which is of type String. public void setUsername(String username) - This will set username and takes String username as a parameter. public Integer getKey() - This will return key and is of type Integer. public void setKey(Integer key) - This will set key and takes Integer key as a parameter. public String getEmail() - This will return email and is of type String. public void setEmail(String email) - This will set email and takes String email as a parameter. public String getPassword() - This returns password and is of type String. public void setPassword(String password) - This will set the password and takes String password as a parameter. public Integer getCash() -

This will return cash and is of type Integer. `public void setCash(Integer cash)` - This sets cash and takes Integer cash as a parameter. `public String getServerAdd()` - This will return serverAdd and is of type String. `public void setServerAdd(String serverAdd)` - This sets serverAdd and takes String serverAdd as a parameter. `public ArrayList<Monster>getMonsters()` - This will return a list of monsters of type `ArrayList<Monster>`. `public void setMonsters(ArrayList<Monster>monsters)` - This sets monsters and takes `ArrayList<Monsters>monsters` as a parameter. `public ArrayList<User>getFriends()` - This will return a list of friends of type `ArrayList<User>`. `public void setFriends(ArrayList<User>friends)` - This sets friends and takes `ArrayList<User>friends` as a parameter. `public ArrayList<Request>getRequests()` - This will get a list of requests of type `ArrayList<Request>`. `public void setRequests(ArrayList<Request>requests)` - This will set requests and takes `ArrayList<Request>requests` as a parameter.

## **11 RequestType class**

The Request class, as the name would suggest, handles the various requests that each of the registered Users will send to each other while playing the game, these include the options to be able to fight and breed with another Users monsters, and also the ability to become friends with another registered User. Aside from these requests, this class also deals with the notification feature we are implementing within our game, this class will be able to tell the User from these notifications what sort of request another User has sent to them, who has sent it, and the ability to respond to the request.

### **11.1 Public methods**

This class is an ENUM class and defines a set of 3 types for request. BATTLE, BREED and FRIEND.

## **12 Data Storage**

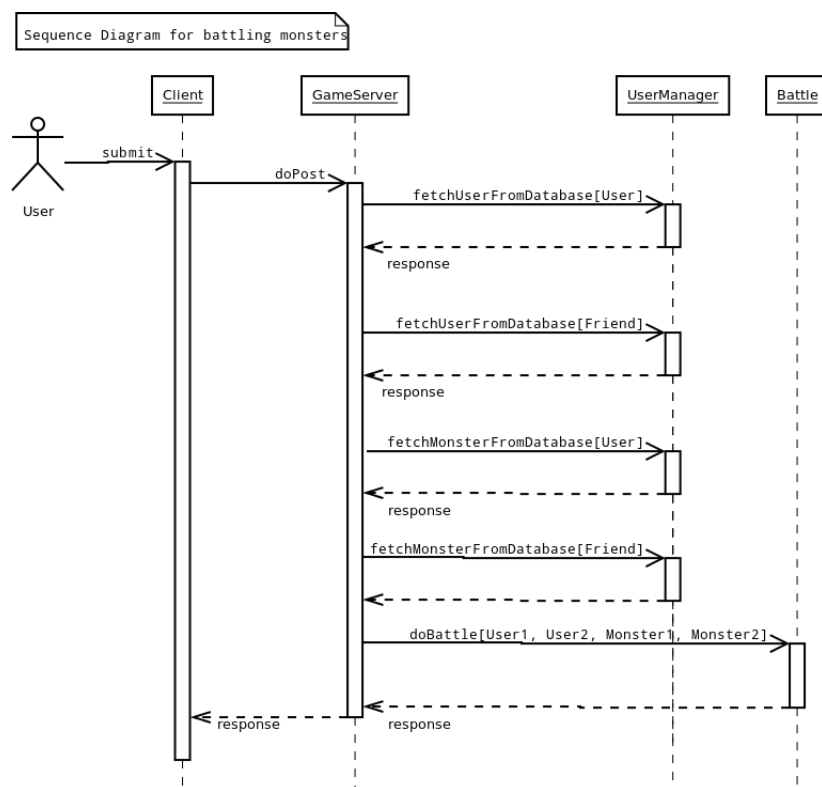
Within the java programming the data is stored in a number of ways, a major way that data will be handled is through enums; requests will be handled through this and will be stored as either battle, breed, or friend, and the states of these requests will also be stored as enums, being either accepted, viewing, pending, or declined. Also stored as enums will be the statuses of monsters, thusly each monster status will be handled as normal, sick, dead, or happy. Breed considers the different types of monster that we plan to be breeding with each other, and this therefore will be stored as an enum with the value of slime, beast, demon, dragon, serpent, or ghost.

Array Lists will also be used, but only, as far as designed, in private instances, so there will be no public instances that need to be explained in class diagrams. Otherwise, usernames, passwords, and the like will be handled in private strings and variable types as are appropriate.

## 13 Sequence Diagrams

### 13.1 Accept Battle

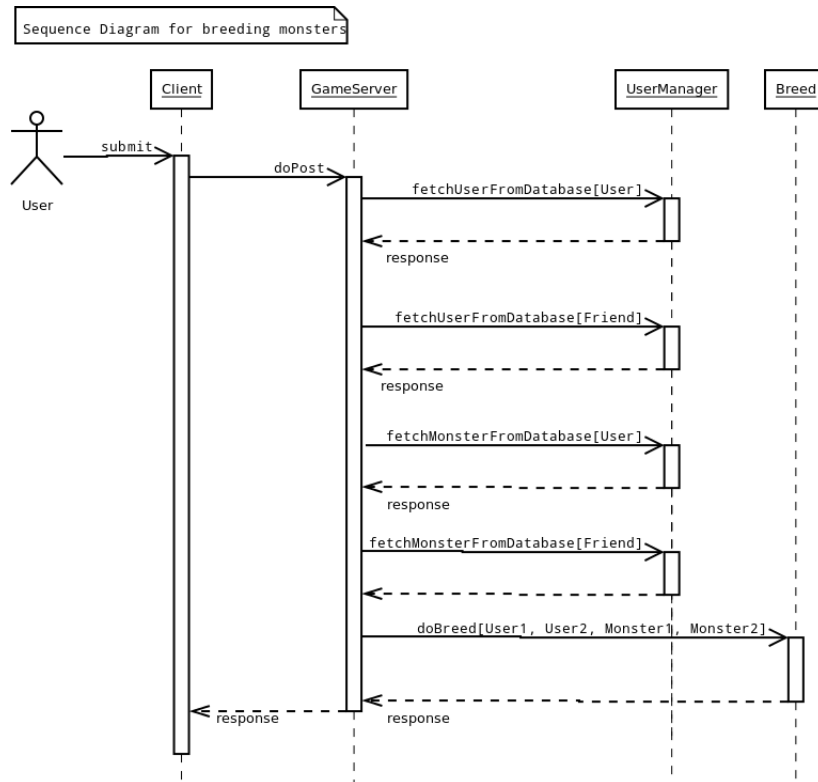
This sequence diagram shows a user accepting a battle request that has been sent to them by a friend. The diagram shows the users response being sent to the server using the "doPost" method. The request then runs through the relevant classes in order to gain the information required.



### 13.2 Accept Breed

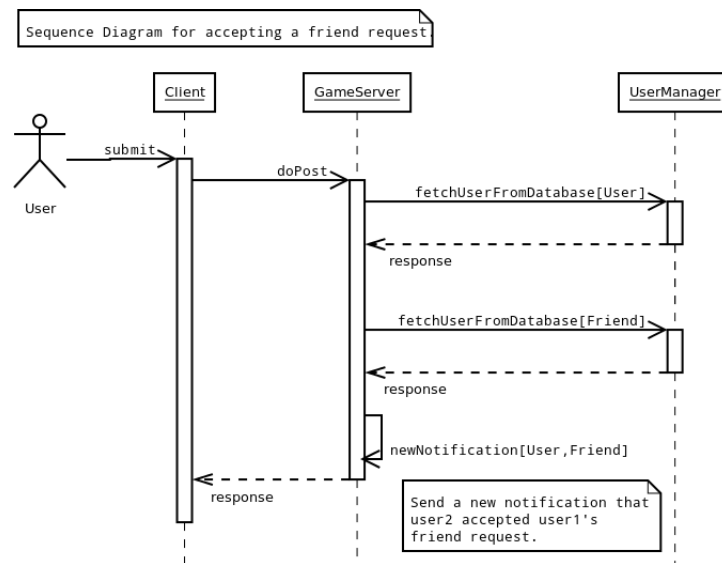
This sequence diagram shows a user accepting a breed request that has been sent to them by a friend. The diagram shows the users response being sent to the server

using the "doPost" method. The request then runs through the relevant classes in order to gain the information required.



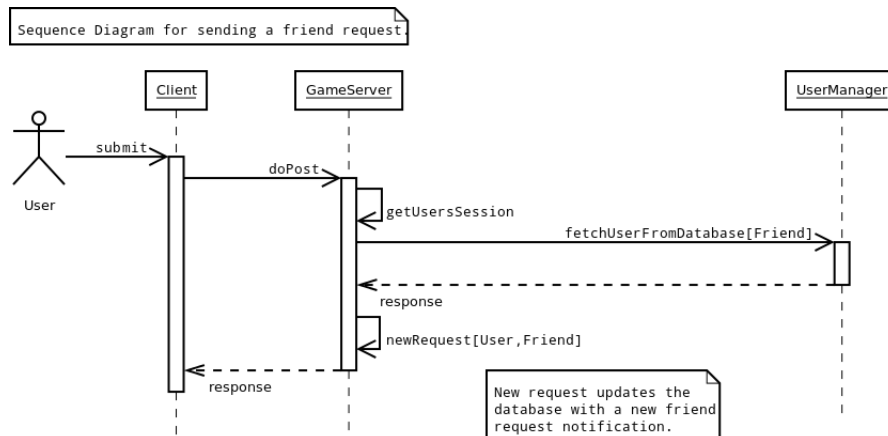
### 13.3 Accept Friend

This sequence diagram shows a user adding a friend. The user's request is sent to the server using the "doPost" method. The request then runs through the relevant classes in order to gain the information required. A request is then sent to the corresponding user using the "addRequest" method and "User class".



## 13.4 Add Friend

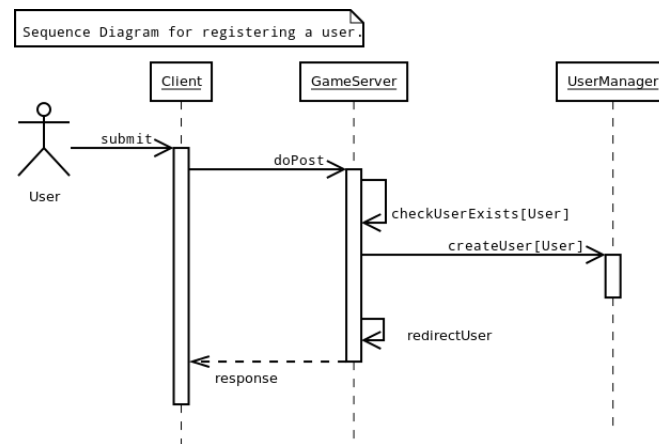
info



## 13.5 Register User

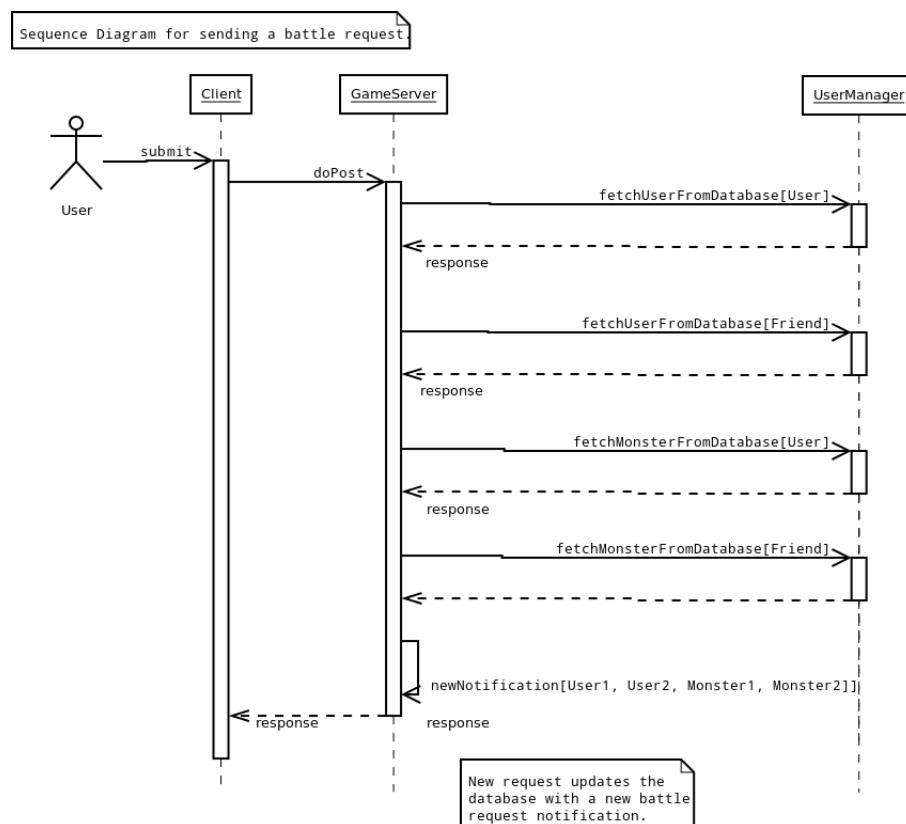
This sequence diagram shows a user submitting their password and username to create a monstermash account. The diagram shows the users password and username being sent to the server using the "doPost" method. The request then runs through the relevant classes in order to process the users details and create the new account.





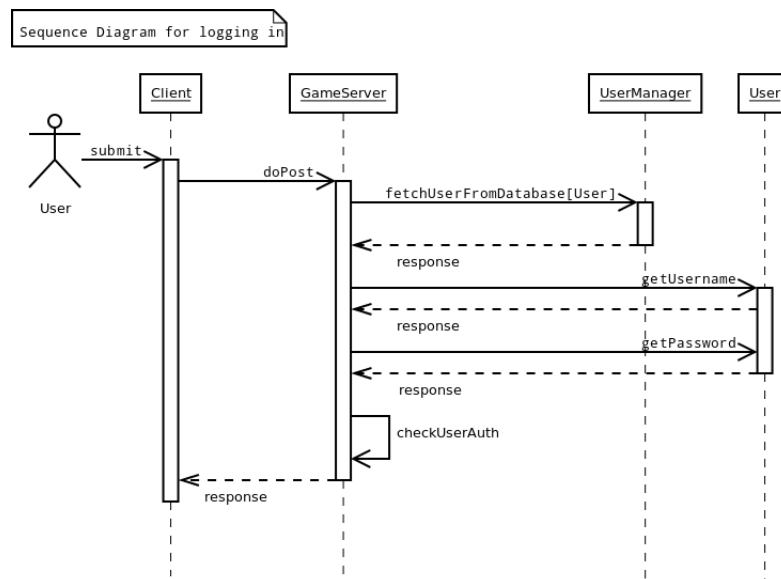
### 13.6 Send battle/breed request

This sequence diagram shows a user sending a breed or battle request to a friend. The diagram shows the users request being sent to the server using the "doPost" method. A request is then sent to the corresponding user using the "addRequest" method and "User class".

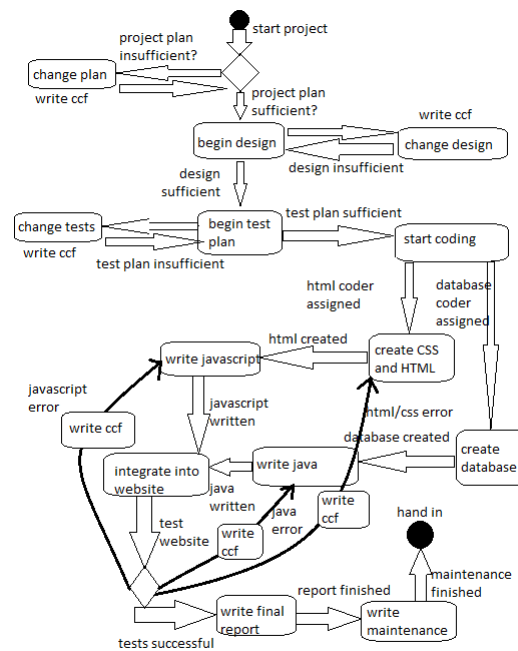


## 13.7 User Log In

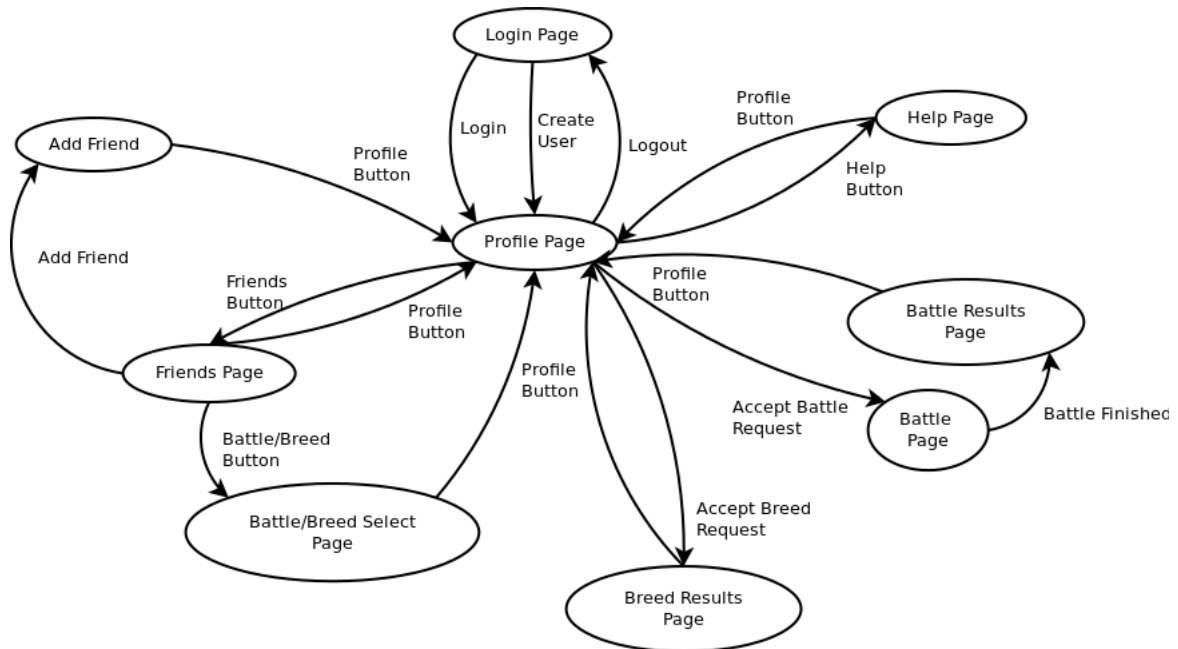
This sequence diagram shows a user logging in to monstermash. The user submits their login information and it is posted to the server using the "doPost" method. The request then runs through the relevant classes, checking the login details. A response is generated if the login details are invalid or the user is logged in if their details are valid.



## 14 Activity Diagram



## 15 State Diagram



### 15.1 State Diagram Description

As you can see, the diagram above shows the design structure for how we want to be able to navigate each of our web pages. I will go through each connection individually, and explain the reasoning behind each.

#### 15.1.1 Login Page to Profile Page

This is the first page that the user will be able to see when going onto our website, the page will require the user to enter their username and password into the allocated areas, once this is done, the user will be taken to the profile page, this is because the profile page is regarded as the users most important page, as this is where the user can decide what s/he plans to do.

#### 15.1.2 Profile page to Various pages

The reason we had the profile page link to most of the pages on the website, was simply because this page acts almost as the home page of our structure, and it makes it easier for the user to have just one page in which they can select most of their

options. If we separated and spread out each of the links to various pages to other pages in the structure, this would likely confuse and frustrate the user, by having them all in the same place, this avoids most issues about navigation that may arise.

### **15.1.3 Profile page to Help page**

It is most likely that if the user had a problem, they would not be on any page other than the profile page, as this would be the starting point for the user, for this reason, we linked the Help page only too and from the profile page.

### **15.1.4 Profile page to Battle page**

As the Battle page one of the most important pages (Alongside Friends) it was important that we put the link to this page in an obvious place, and there is no place more obvious than on your Profile page, as (as was explained before) this page works as the home page of this website, a page that is constantly referred to.

### **15.1.5 Battle page to Battle results page**

After you have accepted an offer of a fight, the user will be taken to an area called the Battle page, in which you can watch the battle between your monster and the opponent that challenged you, after the battle has been completed you will be taken to the Battle results page, we structured this so that if you are the user that sent out the battle request, you will automatically be taken to the Battle Results page, as (as we have explained previously) the user sending out battle requests does not get to view the battle, but just sees the results. After the users have seen the results of their battle(s), they have the option to return to the Profile page, so that they can continue to do other tasks within the game. Profile page to Friends page:

The link to this page is very important, it is from the Friends page you will be able to add and accept who you want to be friends with in monster mash, who you would like to battle with, and whos monsters you would like to breed with. Without this page, the game simply would not work. So for this reason, we linked this page to the Profile page, similar to the reason with the Battle page, this was done so the user can find this page easily, as the Profile page will be the most visited page on the website.

### **15.1.6 Friends page to Various pages**

From this page, it is possible to do three separate things, you will be able to manage your friends, select which monsters you wish to breed with, and select which monsters you wish to battle. We decided to put these options on this page

and NOT on the Profile page, because you would begin to run the risk of cluttering the Profile page, as important these tasks are to the game, we concluded that it would be much more neat and less confusing to put these options within a separate Friends page, so the user wouldn't be drowned with options on the Profile page.

#### **15.1.7 Friends page to Battle/Breeding page**

Originally, we were going to have the Battle and Breeding pages separate here, so the user would be able to select which one they wanted. It was only later on that we realised that both these tasks could be accomplished on the same page, so having them on the same page was unnecessary. Once the user has selected whether they want to breed or battle certain monsters, the user will be directed back to the Profile page, this is a running theme in our structuring, as this is where everything on the website stems from.

#### **15.1.8 Friends page to Add Friend page**

It would seem fairly obvious that from the Friends page, we would be able to select which friends we would want to add, so from here, we added an Add Friends page, in which the user can type the recipients email or username, to send a friend request. Once the user has finished adding the friends they wish, they can then link back to the Profile page, to continue with other tasks they may wish to do.

#### **15.1.9 Profile page to Breeding Results page**

This link is very similar to the Battle page explained earlier, the only difference being that it does not matter who was the recipient of the offer or not, they would both be linked straight to a breeding results page. Once the user has looked at the results, they can then link back to the Profile page.

#### **15.1.10 Profile page to Logout**

For a small while, we did consider having a logout page on every page of the website, but we theorised that this may cause problems that would be difficult to fix, for example, what would happen if you logged out in the middle of a battle on the Battle page. For this reason, to avoid confusion, we only put the logout page on the Profile page, as this guarantees that the user is not in the middle of a task.

## **REFERENCES**

- [1] *N/A*

## **DOCUMENT HISTORY**

Version	CCF No.	Date	Changes made to Document	Changed by
1.0	N/A	2012-10-31	Initial creation	CPM4
1.1	6	2012-11-2	Added information from Mike	CPM4
1.2	7	2012-12-5	Updated config ref and added other documents	CPM4
1.3	8	2012-12-6	Added missing data and fixed few mistakes	CPM4
1.4	9	2013-13-28	Changes made based on feedback	THR5