

# Requirements Specification

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## Hobby Information Tracker Hobb-IT



By

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# Requirements Specification

## 1.1 Product Overview and Summary

As online shopping becomes an ever expanding market, consumers are continually faced with a variety of new vendors offering the same merchandise. More than ever, hobby enthusiasts are employing the internet to purchase goods. Illumination Technologies will develop a program which can provide updates on changes in prices of *Magic: The Gathering* playing cards. Illumination Technologies will scrape data from a list of online websites given to Illumination Technologies by Dr. Lim. The system to be able to store and track the prices of the *Magic: The Gathering* cards from day to day. The system, Hobby Information Tracker (Hobb-IT), will also be able to compare how the price of one card varies between retailers. Hobb-IT will be able to keep track of what cards each user has already purchased, searched for, or hopes to track.

## 1.2 Development and Production Environments

### *Server:*

Operating System: CentOS 5.2, Kernal 2.6.18-92e15  
Server Name: oraserv.cs.siena.edu  
CPU Type: Intel Xeon 2.66 GHz  
Memory: 8GB Memory

### *Macintosh Computer:*

Operating System: OSX Version 10.7.4  
Model: Mac  
Processor: 2.5 GHz Intel Core i5  
Memory: 4GB 1333 MHz DDR3  
HD Size: 500GB

### *Windows Computer:*

Operating System: Windows Vista Enterprise Service Pack 2 (build 6002)  
Model: Dell  
Processor: 2.93 GHz Intel Core2 Duo  
Memory: 4.00 GB  
HD Size: 320GB

## 1.3 User Case Narratives

### Administrator-

An *Administrator* account is a built-in user in the *Hobby Information Tracker* (Hobb-IT). There is only one *Administrator* account for this system. The *Administrator* will be able to monitor and update the system. The *Administrator* will determine how to parse a website's content. The *Administrator* will be able to access the search history of all users. The *Administrator* will be able to access the database to see and to change the login credentials of all users. The *Administrator* will be able access all of the stored data. The *Administrator* will be able to pick the default website used for the real-time search functionality by the *Guest User*.

### Advanced User-

An *Advanced User* is someone who has been assigned a username and password by the *Administrator*. The *Advanced User's* account will be used to login into the system. Once logged into the system, an *Advanced User* will be able to search for the real-time price of a *Magic: the Gathering (MTG)* card from any tracked website. The *Advanced User* will have saved lists of previously tracked *MTG* cards, already bought *MTG* cards, and *MTG* cards the *Advanced User* wishes to track in the future. The *Advanced User* will have the option to modify what *MTG* cards are on each list. The *Advanced User* will have the ability to access any previous searches requested from the system associated with the *Advanced User's* account. The *Advanced User* will be able to view a visual representation of the fluctuations in prices of a *MTG* card.

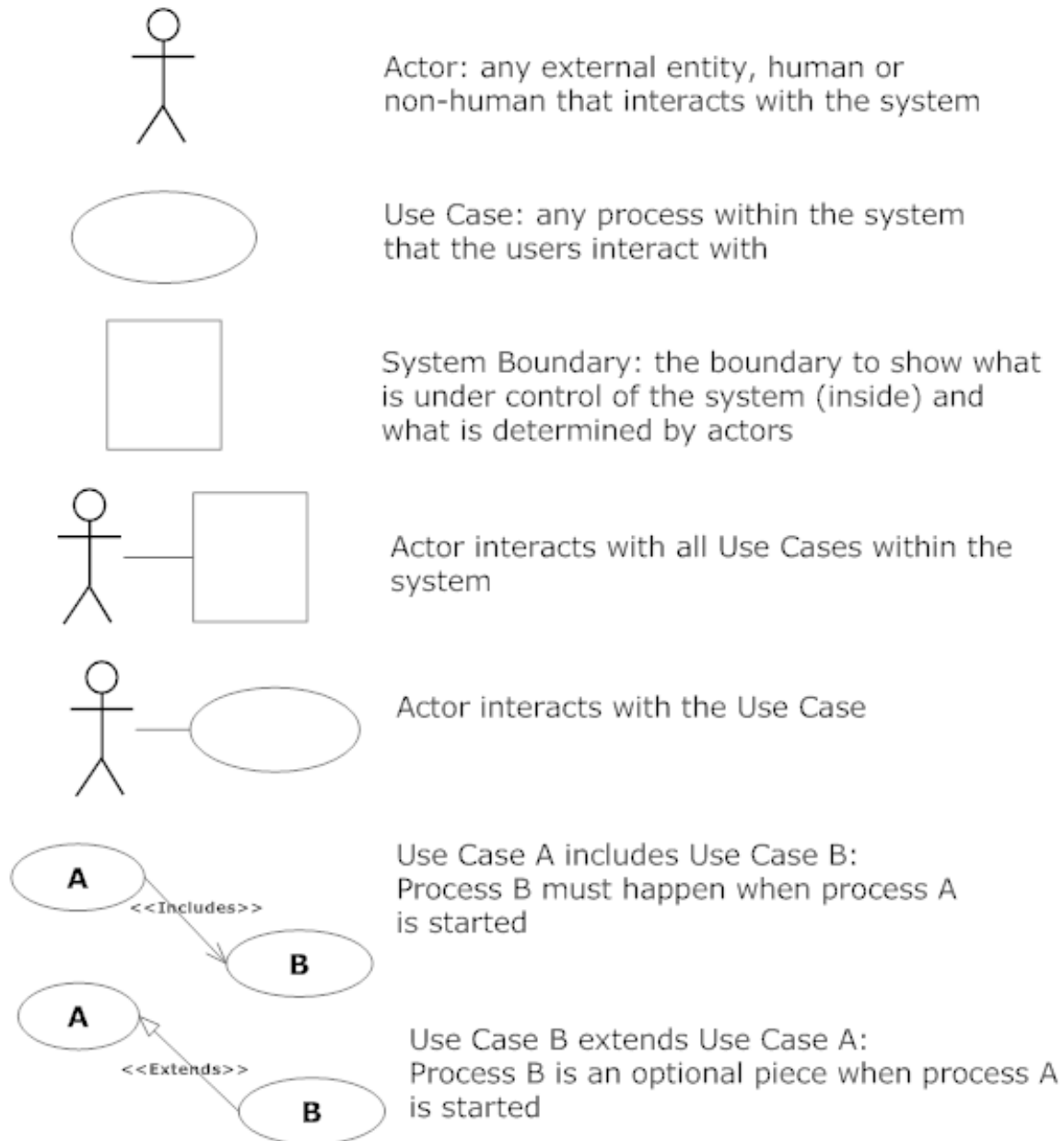
### Guest User-

A *Guest User* is defined as any person who is not an *Advanced User* or *Administrator*. The *Guest User* will be able to access some features of Hobb-IT without logging in to the system. The *Guest User* will be able to lookup the real-time price and condition of a *MTG* card from a designated website specified by the *Administrator*.

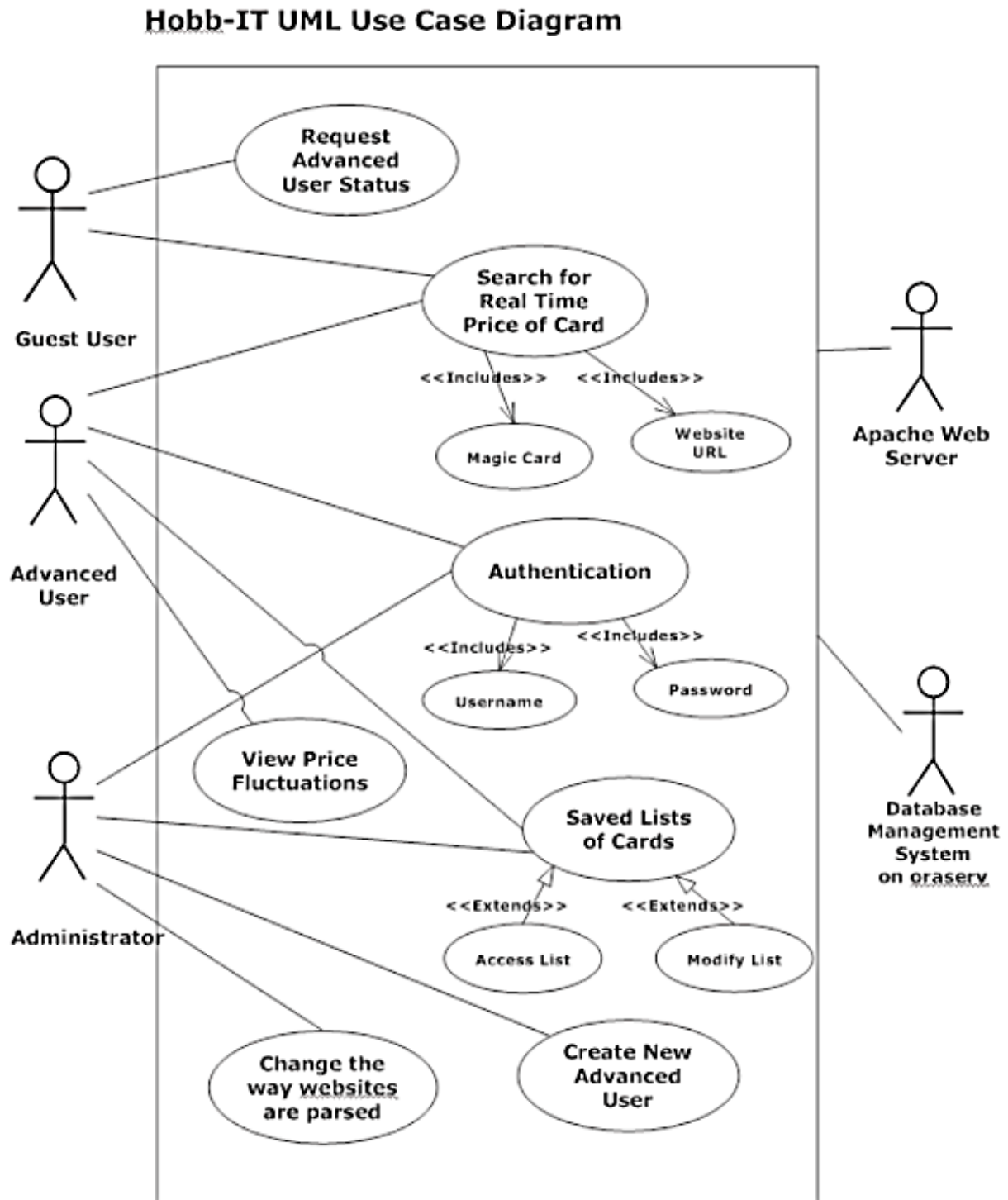
## 1.4 UML Use Case Diagram

### 1.4.1 Diagram Legend

#### UML Use Case Diagram Legend



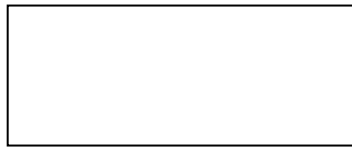
### 1.4.2 UML Use Case Diagram for Hobb-IT



## 1.5 Data Flow Diagrams

The following diagrams are the data flow diagrams for Hobb-IT. Within these diagrams one can see the movement of data between processes in the system and the external entities of the system. There are various levels to these diagrams which will be explained in the content below, which explains the symbols which will be used in these data flow diagrams.

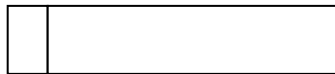
### 1.5.1 Diagram Legend



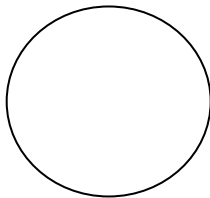
**External Entity**: Represents outside sources of data to and from the system



**Data Flow**: Represents the movement of data



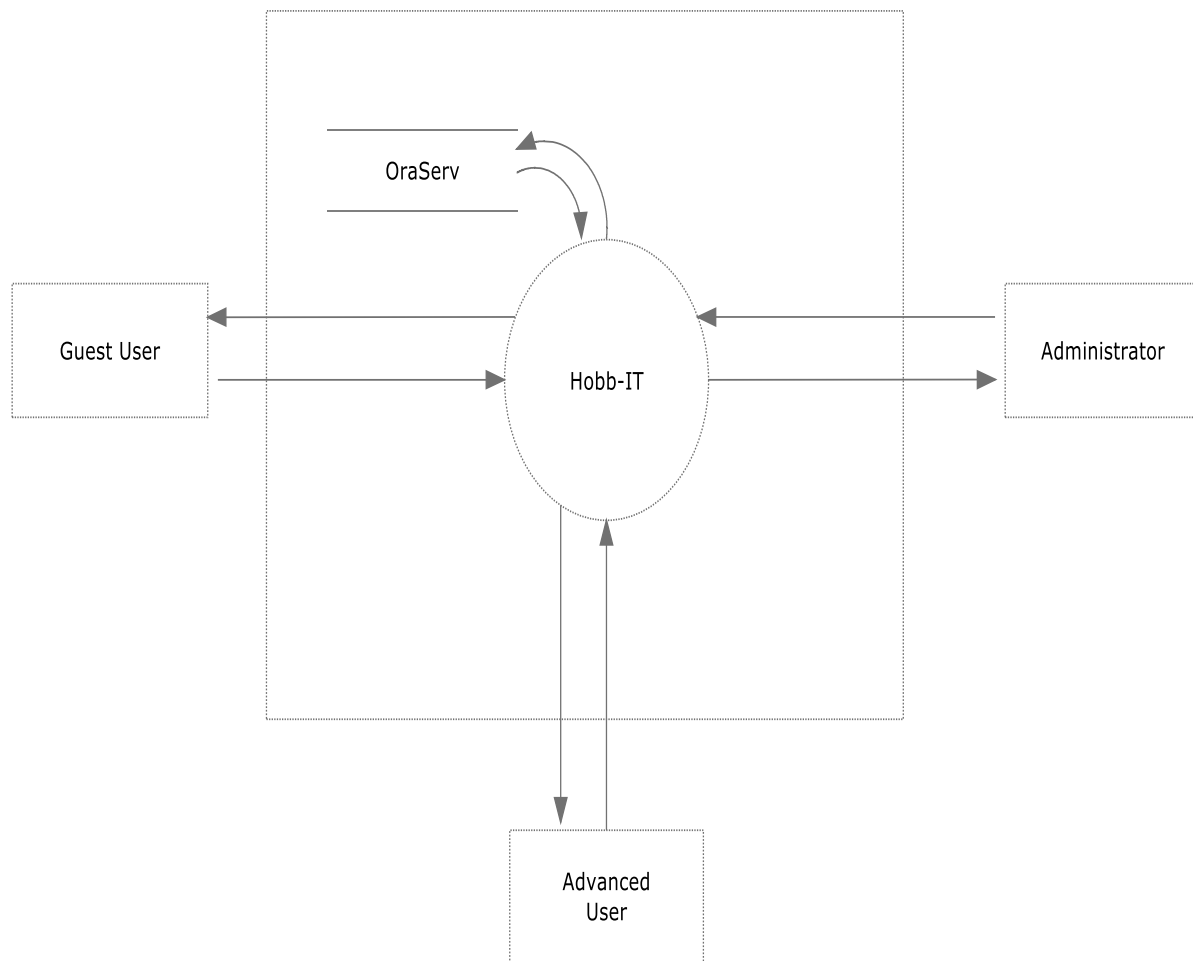
**Data Store**: Represents data that is not moving or at rest



**Process**: Represents an activity that manipulates the data

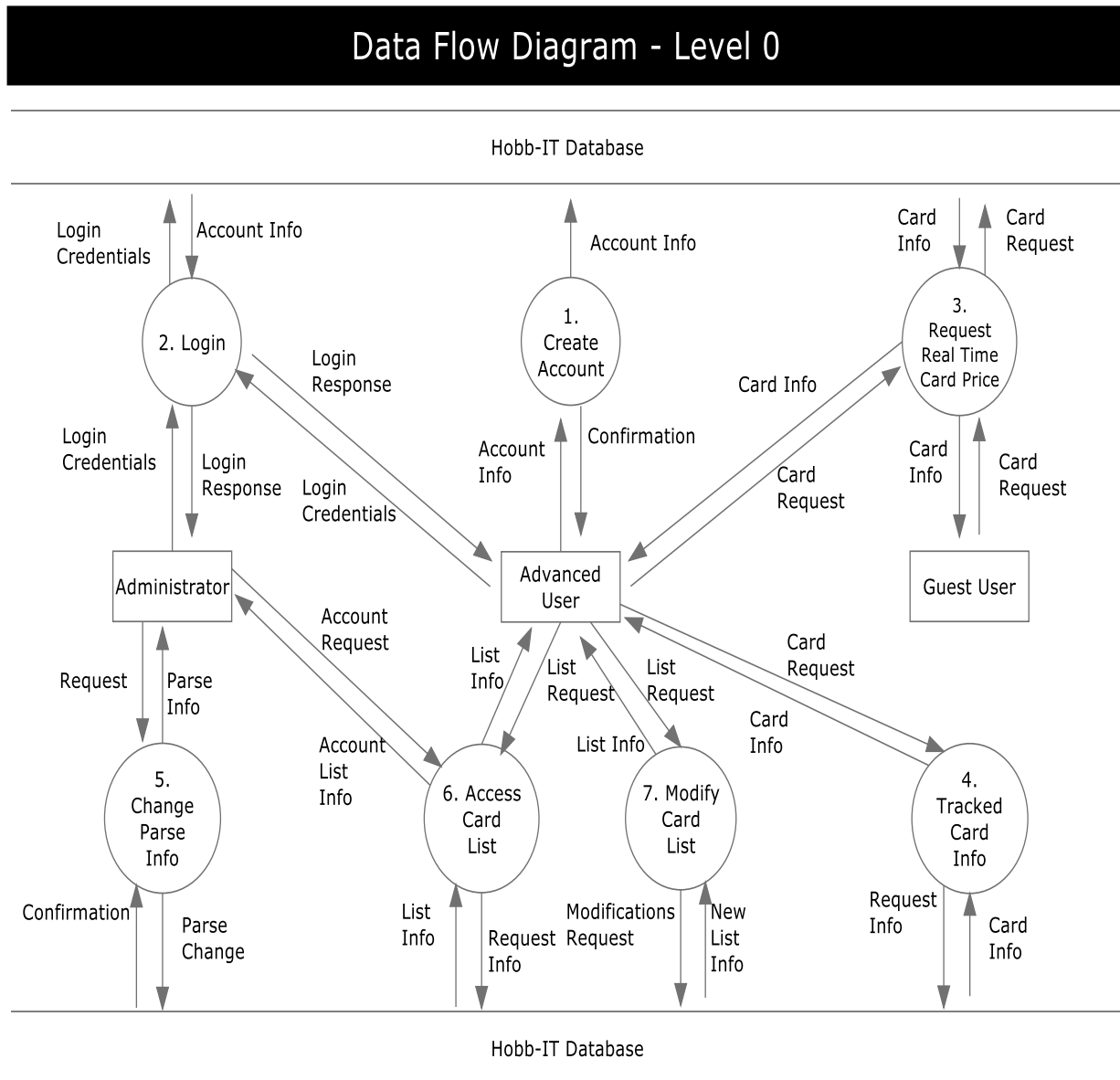
### 1.5.2 Context Diagram

#### Data Flow Diagram - Context Diagram



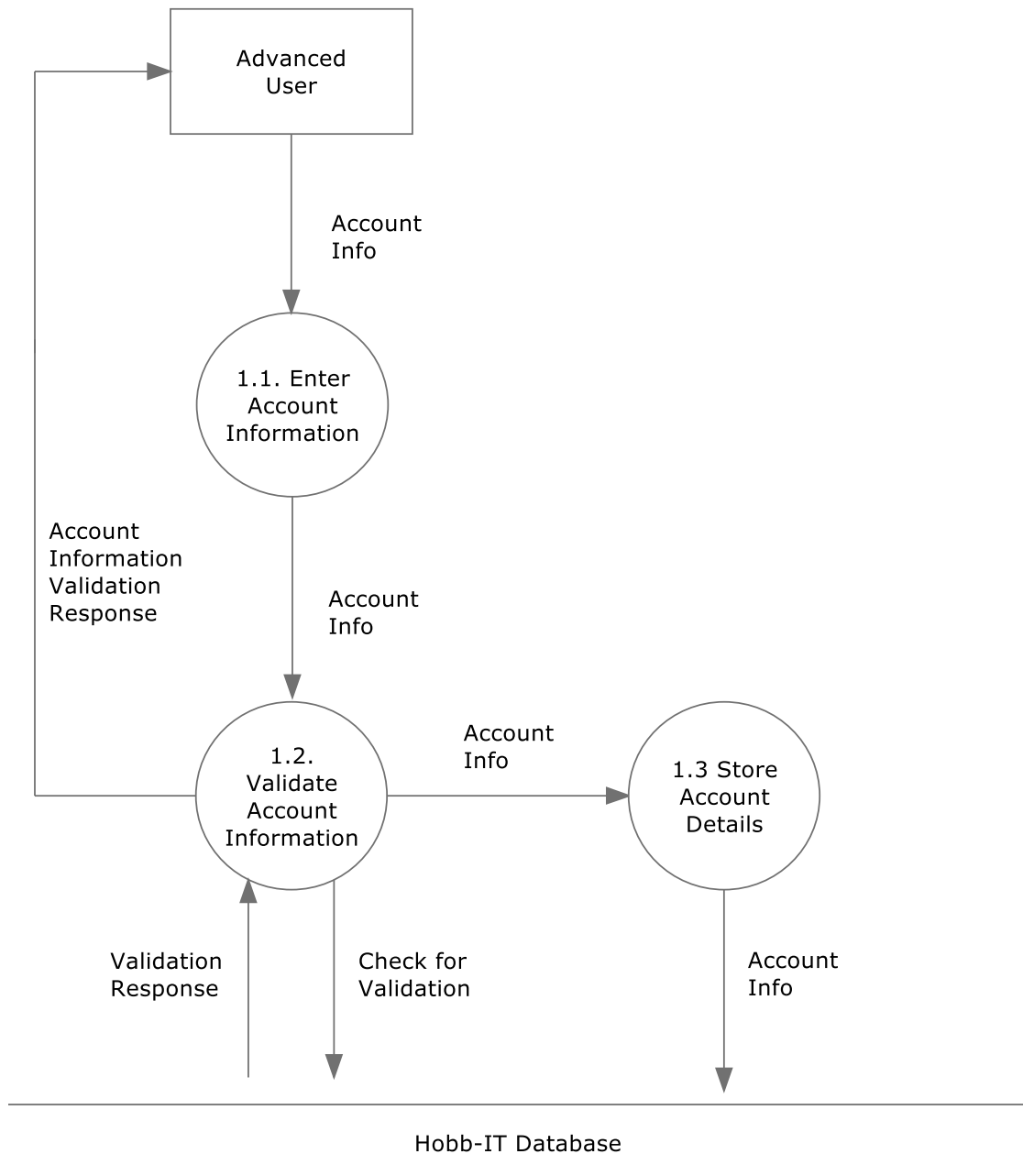


### 1.5.3 Level 0 Diagram

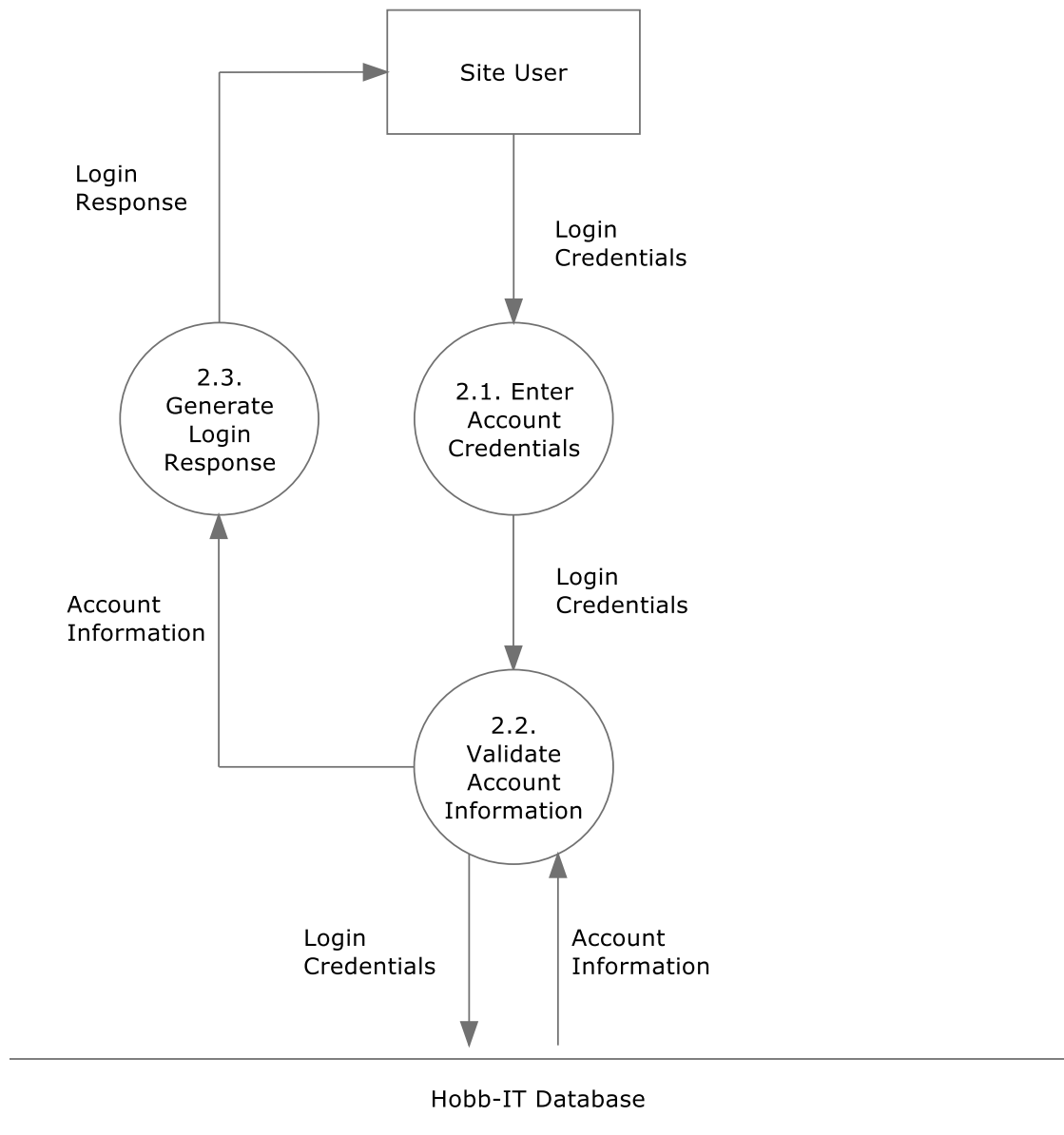


### 1.5.4 Level 1 Diagrams

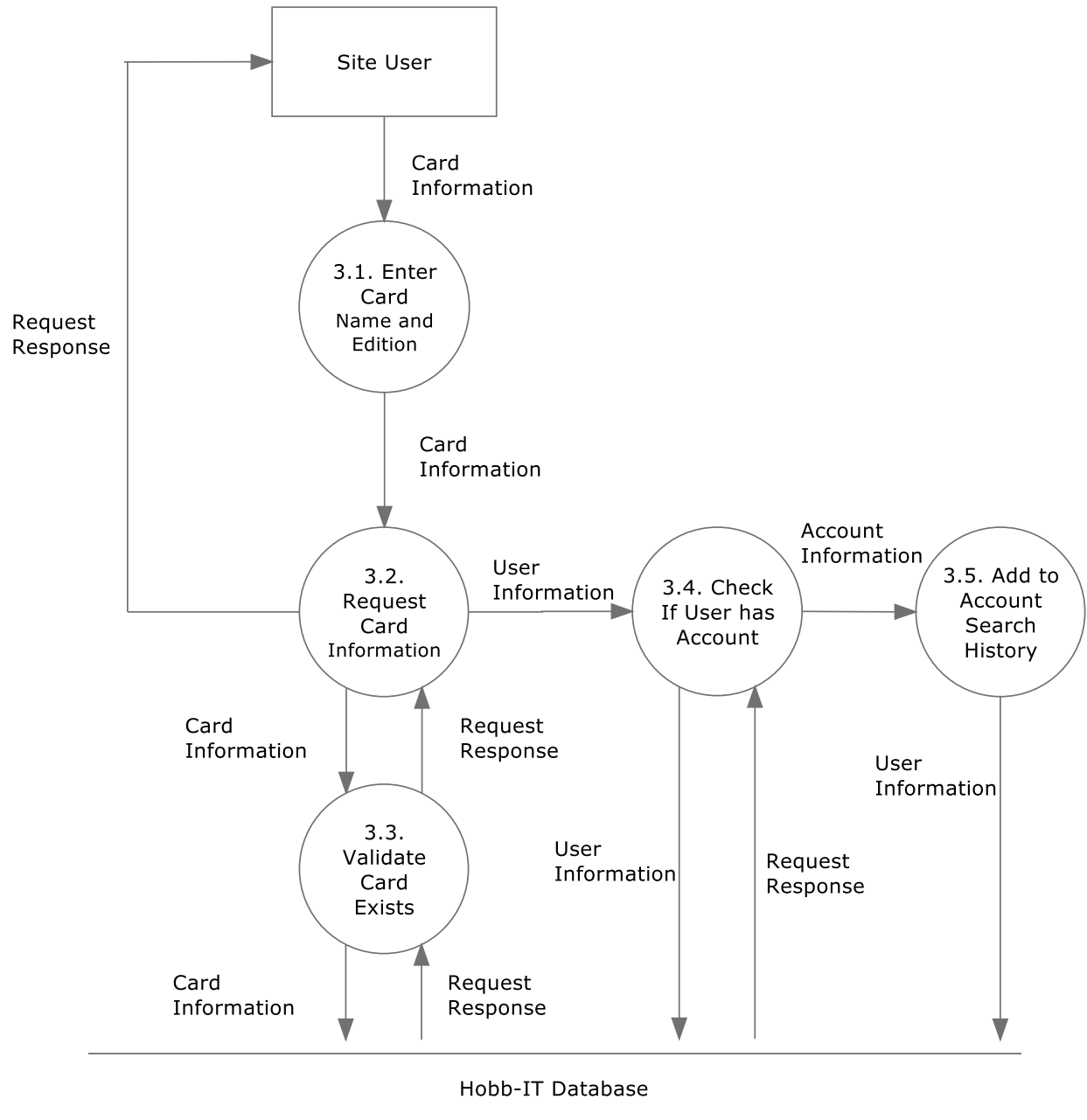
## Data Flow Diagram - Level 1: 1. Create Account



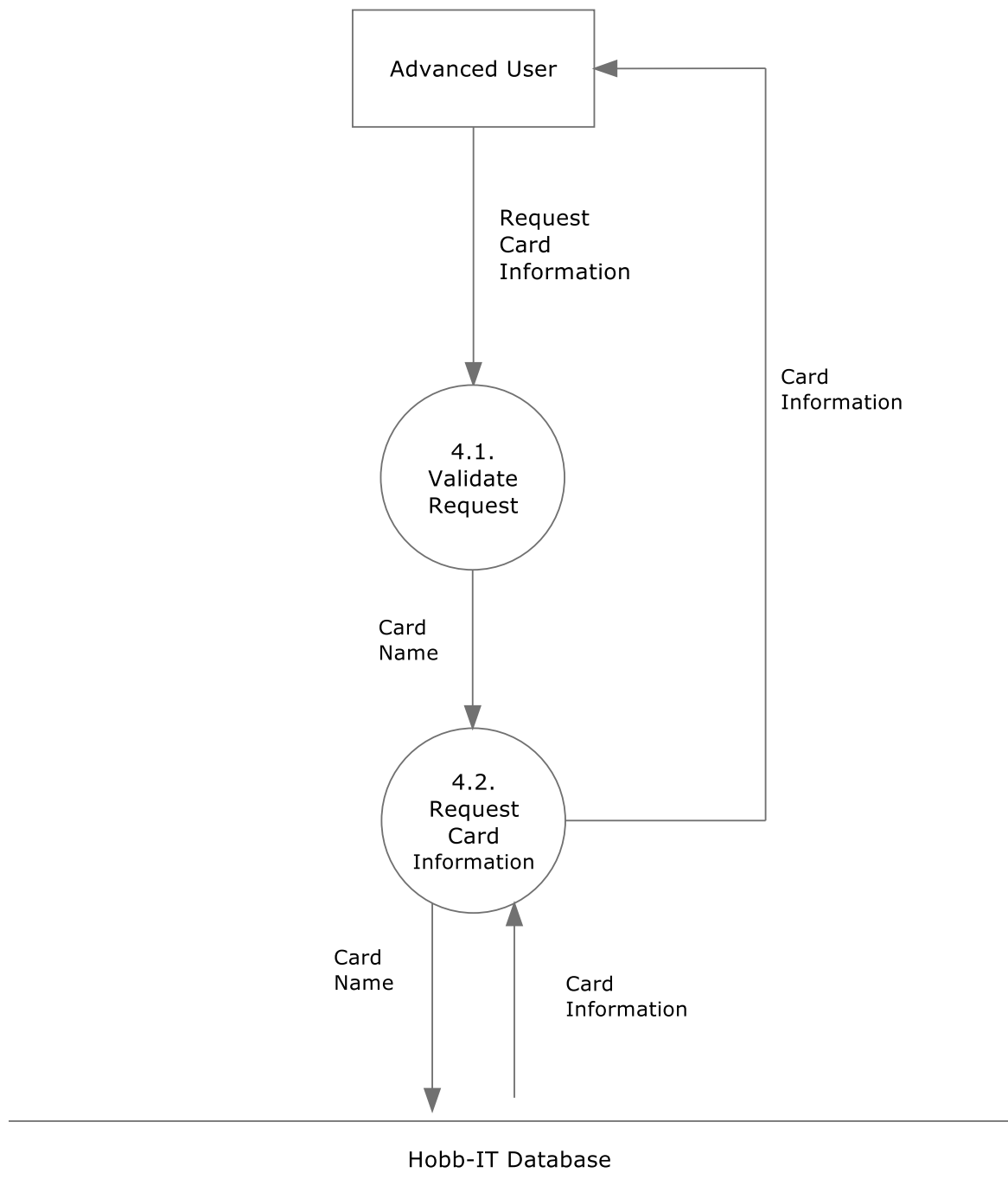
## Data Flow Diagram - Level 1: 2. Login



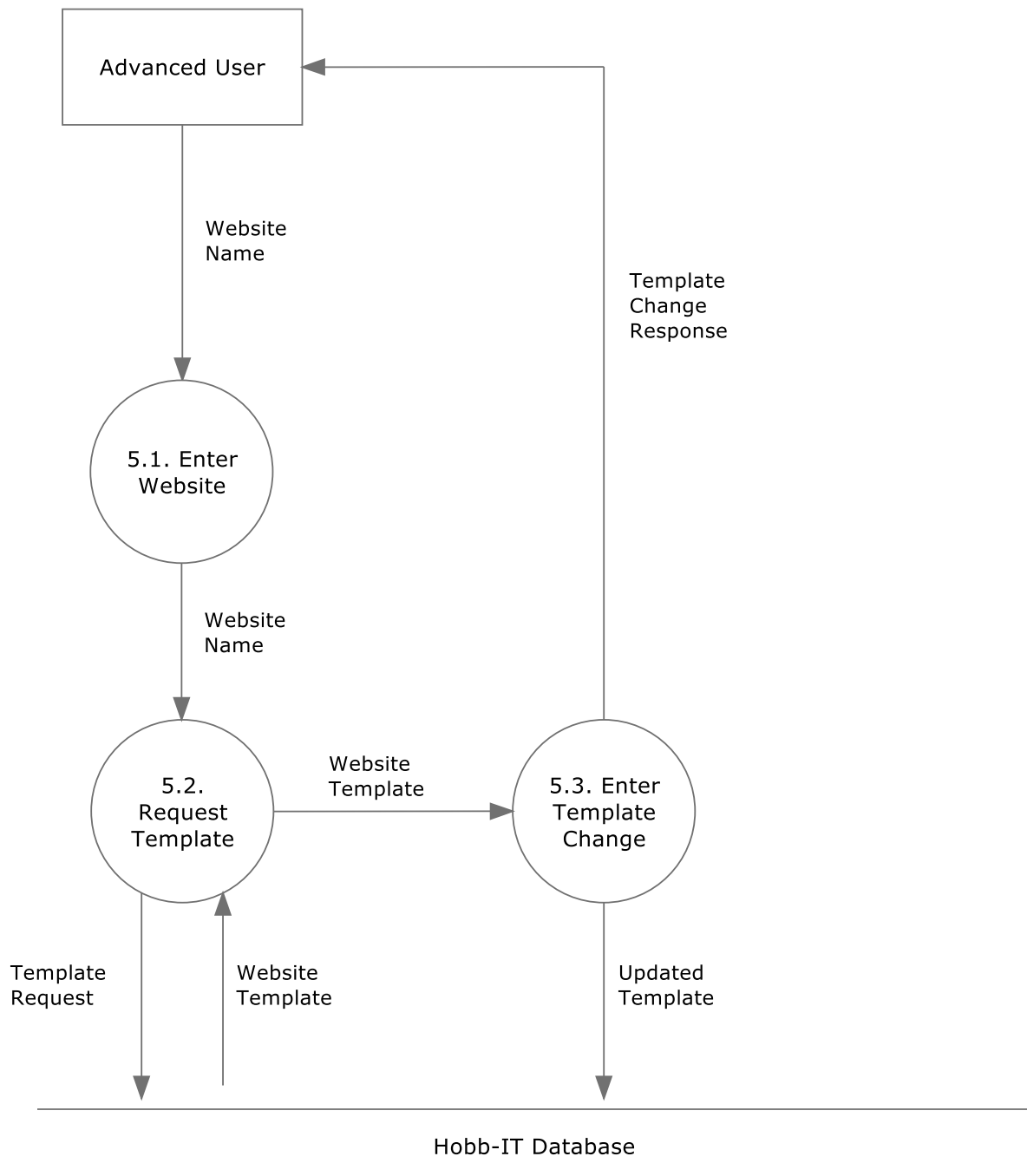
## Data Flow Diagram - Level 1: 3. Request Real Time Card Price



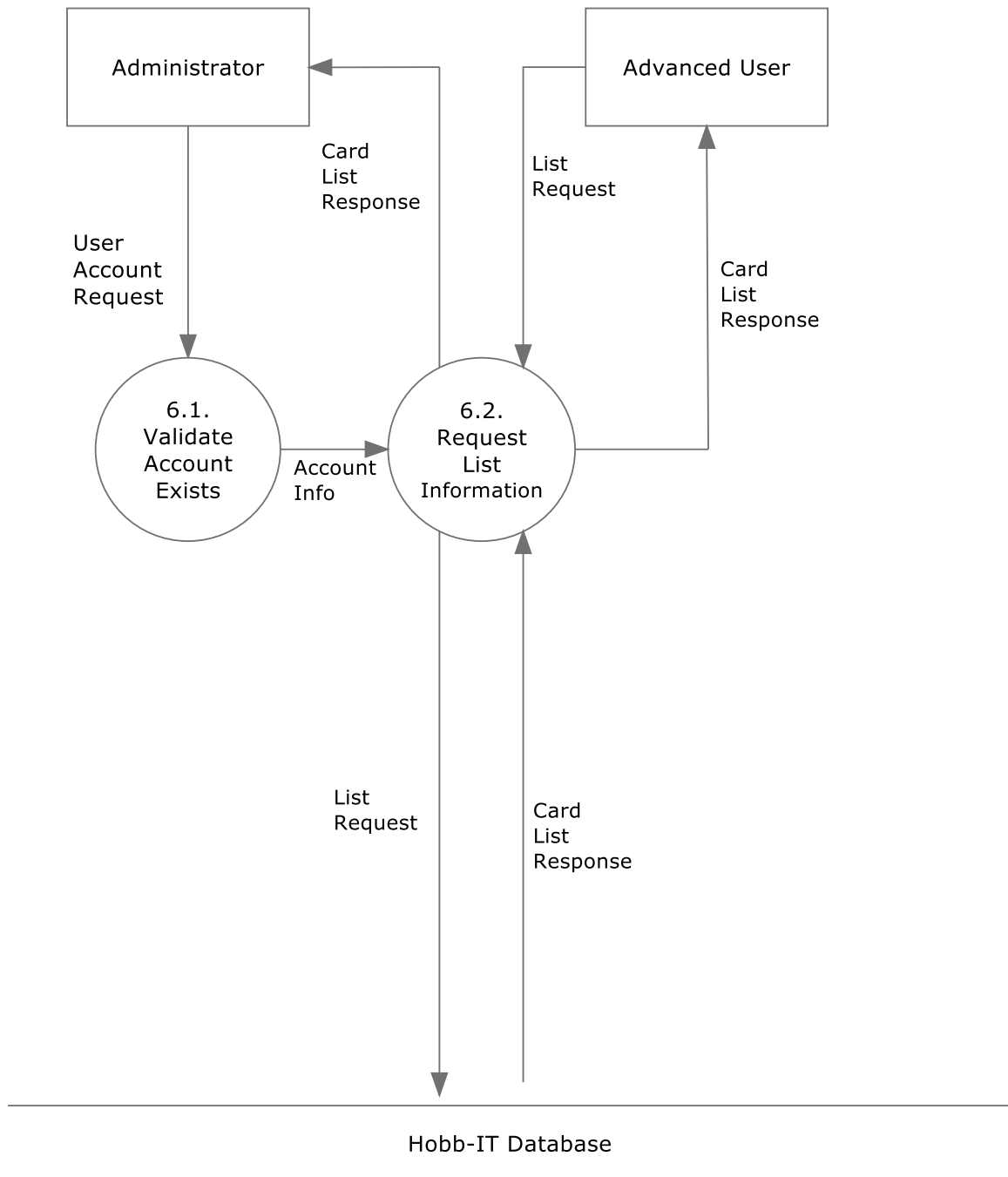
## Data Flow Diagram - Level 1: 4. Tracked Card Information



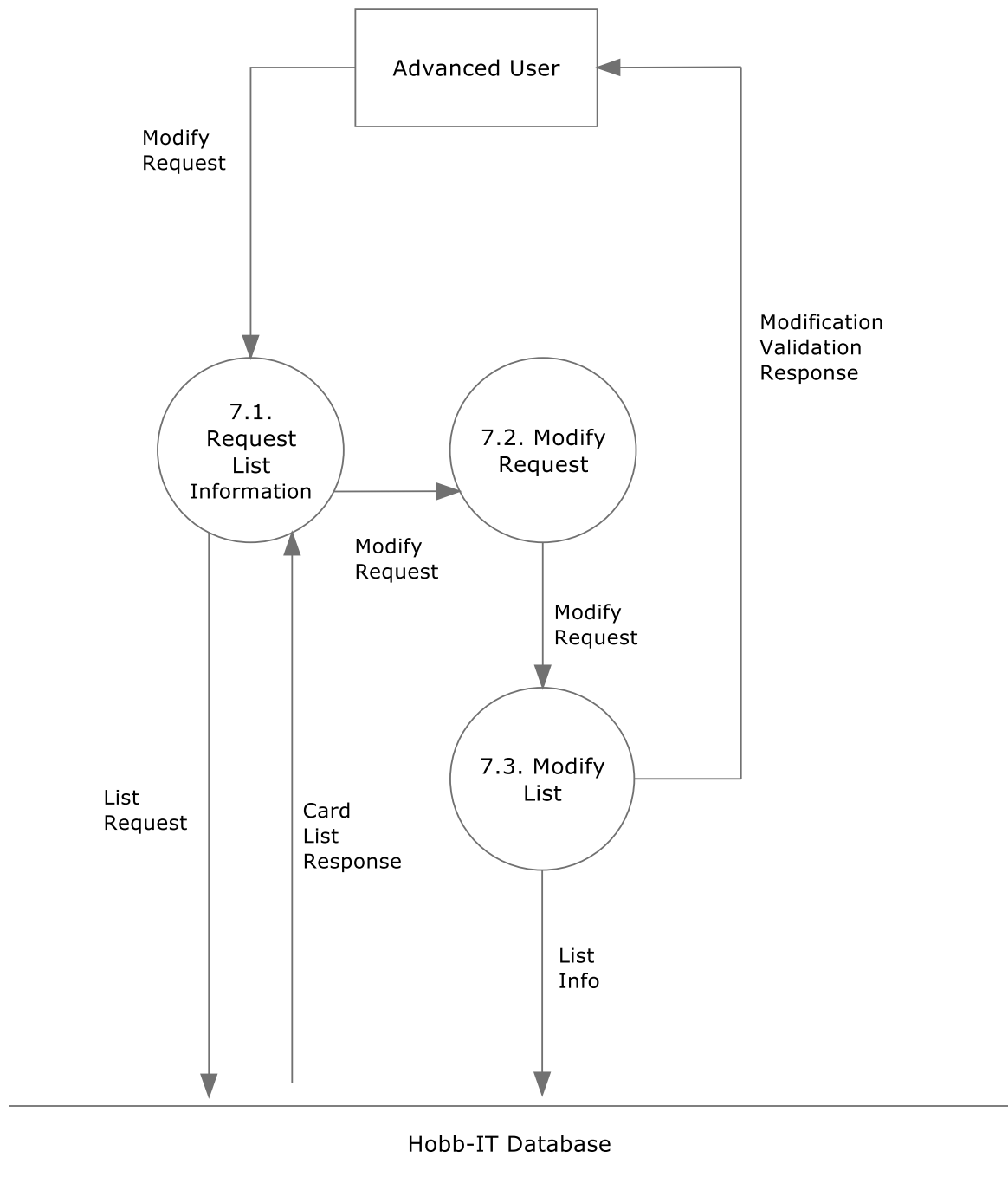
## Data Flow Diagram - Level 1: 5. Change Parse Information



## Data Flow Diagram - Level 1: 6. Access Card List



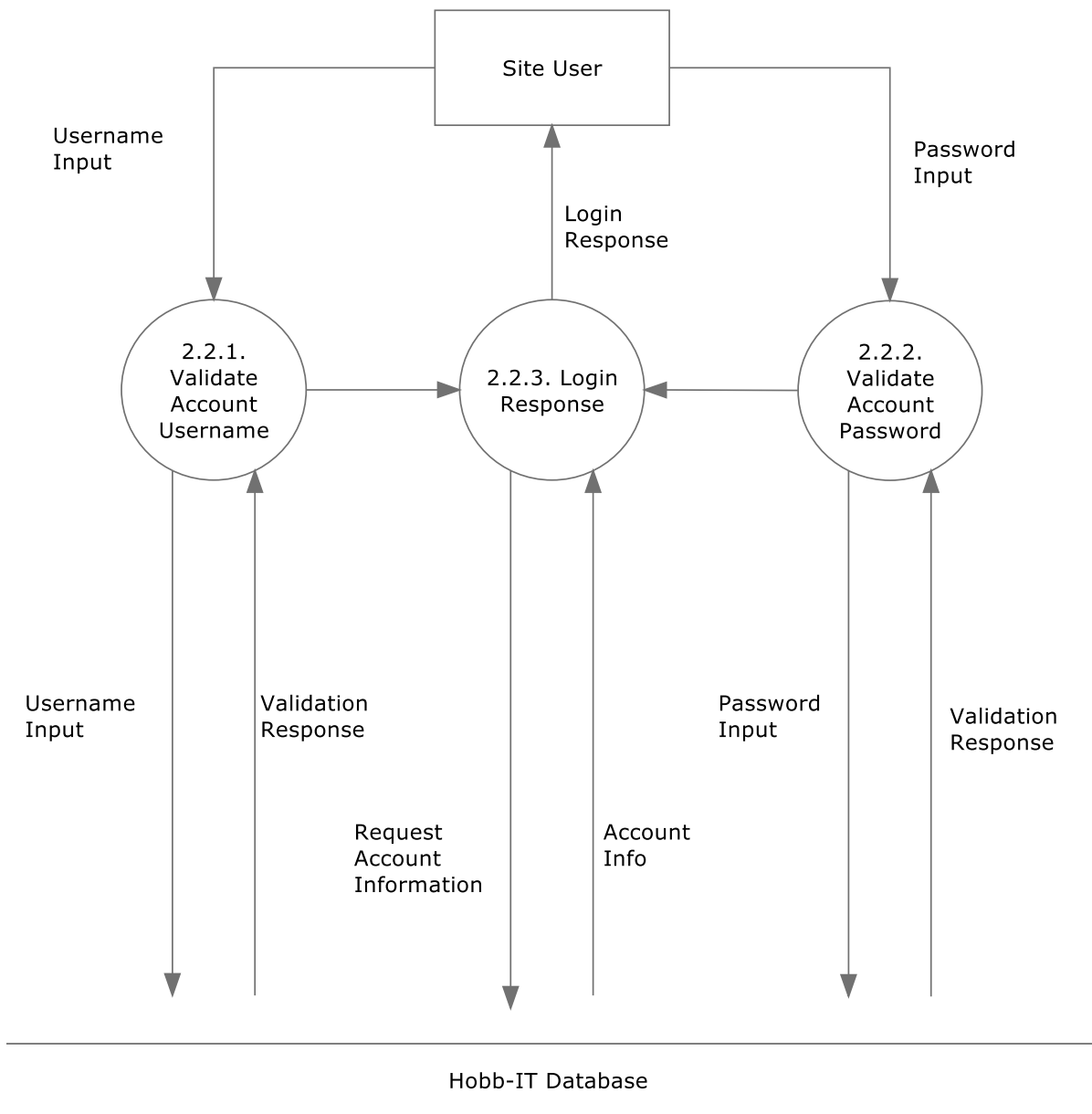
## Data Flow Diagram - Level 1: 7. Modify Card List





### 1.5.5 Level 2 Diagram

#### Data Flow Diagram - Level 2: 2.2 Validate Account Information



## 1.6 Prototypes Used for Discovery

### 1.6.1 Prototypes used for Web-Scraping

Illumination Technologies looked at a variety of tools in order to determine the feasibility of scraping the websites provided to Illumination Technologies by Dr. Lim for tracking *Magic: The Gathering* cards. For Illumination Technologies' prototype Illumination Technologies used a Java library called Jsoup to parse the HTML and retrieve the information necessary for Hobb-IT. Jsoup provides an easy API for extracting and manipulating data using Cascading Style Sheets and the Document Object Model.

For the websites provided to Illumination Technologies by the client, Illumination Technologies was required to determine if five needed MTG card attributes could be found. Illumination Technologies and this document will refer to these attributes as the *five attributes* which are listed below:

1. Card Name
2. Edition
3. Condition
4. Price
5. Quantity

Illumination Technologies used two different sites provided by the client called *TrollandToad.com* and *CardKingdom.com* to test the whether the Jsoup library would be able to successfully scrape websites for the *five attributes*.

## Example 1: Troll and Toad


The yellow boxes indicate where on the webpage the *five attributes* are located.

:rollandtoad.com/p83556.html

AD.COM All Search [Log in](#)

YUGIOH POKEMON CFV, WOW & OTHER CCGS MINIATURES BOARD GAMES D&D & RPGS GAME SUPPLIES SPECIALS & LOTS NOVELTIES & APPAREL VIDEO GAMES

legends



Rarity:  
Rare

Color:  
Black

Casting Cost:  
2

Card Type:  
Sorcery

Card Text:  
All non-black creatures are destroyed. Hellfire does X + 3 damage to you, X is the number of creatures placed in the graveyard.  
"High on a throne of royal state... incantate to pursue your war with hate'n." —John Milton, Paradise Lost

Like 0 Send

Pin it Tweet 0

| Hellfire (Legends) |            |   |   |
|--------------------|------------|---|---|
| English Near Mint  | 1 in stock | <a href="#">ADD TO CART</a><br><a href="#">ADD TO WISH LIST</a> | <a href="#">SELL US YOURS</a><br>for<br><b>\$7.00</b> |
|                    | \$16.99 1  |   |   |
| English Played     | 1 in stock | <a href="#">ADD TO CART</a><br><a href="#">ADD TO WISH LIST</a> |   |
|                    | \$11.89 1  |   |   |

Shipping weight: 0.004 pounds (Size: 3.50" H x 2.50" W x 0.01" D)

The following code below shows that the *five attributes* can be parsed and retrieved from the website *TrollandToad.com*

```
import java.io.IOException;
import org.jsoup.*;
import org.jsoup.nodes.Document;
import org.jsoup.select.Elements;

public class TrollAndToad {

    public static void main(String args[]){
        try {
            Document doc =
                Jsoup.connect("http://www.trollandtoad.com/p83556.html").get();
            Elements conditions =
                doc.getElementsByClass("productquantity");
            Elements prices =
                doc.getElementsByAttributeValue("class" , "productprice");
            Elements cardNames =
                doc.getElementsByAttributeValue("class" , "pname1");
            String cardName =
                cardNames.get(0).text();

            System.out.println("Card name = " + cardName.substring(0
                ,cardName.indexOf("(")));
            System.out.println("Edition = " +
                cardName.substring(cardName.indexOf("(") +1 ,
                cardName.indexOf(")")));
            System.out.println("Condition = " + conditions.get(0).text());
            System.out.println("Price = " + prices.get(1).text());
            System.out.println("Quantity = " + prices.get(0).text());

        }
        catch (IOException e) {
            e.printStackTrace();
        }
    }
}
```


### The Result (10/22/13):

Card name = Hellfire  
 Edition = Legends  
 Condition = English Near Mint  
 Price = \$16.99  
 Quantity = 1 in stock

## Example 2: Card Kingdom


The yellow boxes indicate where on the webpage the *five attributes* are located.

[www.cardkingdom.com/catalog/item/21120](http://www.cardkingdom.com/catalog/item/21120)


[Shopping](#)

**Search:**   (advanced search)

[Home](#) > [Magic: The Gathering](#) > [Legends](#) > [Hellfire](#)



**Legends: Hellfire**  

Oracle Text:  
 Destroy all nonblack creatures. Hellfire deals X plus 3 damage to you, where X is the number of creatures put into all graveyards this way.

Edition: **Legends**

Type: Sorcery

Cast: ② ③ ④ ⑤

Rarity: R

Pow/Tuf:

| Style | Price | Stock | Qty                  |
|-------|-------|-------|----------------------|
| NM    | 14.99 | 6     | <input type="text"/> |
| EX    | 11.99 | 3     | <input type="text"/> |
| VG    | 10.49 | 1     | <input type="text"/> |
| G     | 7.50  | -     | -                    |

Don't see what you need?  
 Try our [Restock Notice Feature](#)

The following code below shows that the *five attributes* can be parsed and retrieved from the website *CardKingdom.com*

```
import org.jsoup.Jsoup;
import org.jsoup.nodes.Document;
import org.jsoup.select.Elements;

public class CardKingdom {
    public static void main(String args[]){
        try{
            String website =
                "http://www.cardkingdom.com/catalog/item/21120";
            Document doc =
                Jsoup.connect(website).get();
            Elements conditions =
                doc.select(".grid tbody tr");
            Elements names =
                doc.select("td b");
            String name =
                names.get(1).text().substring(names.get(1).text().indexOf(":") + 1);

            System.out.println("Card name = " + name);
            String edition =
                conditions.get(1).text().split(" ")[1];
            System.out.println("Edition = " + edition);

            String breakdown[] =
                conditions.get(7).text().split(" ");

            System.out.println("Condition = " + breakdown[0]);
            System.out.println("Price = " + breakdown[1]);
            System.out.println("Quantity = " + breakdown[2]);

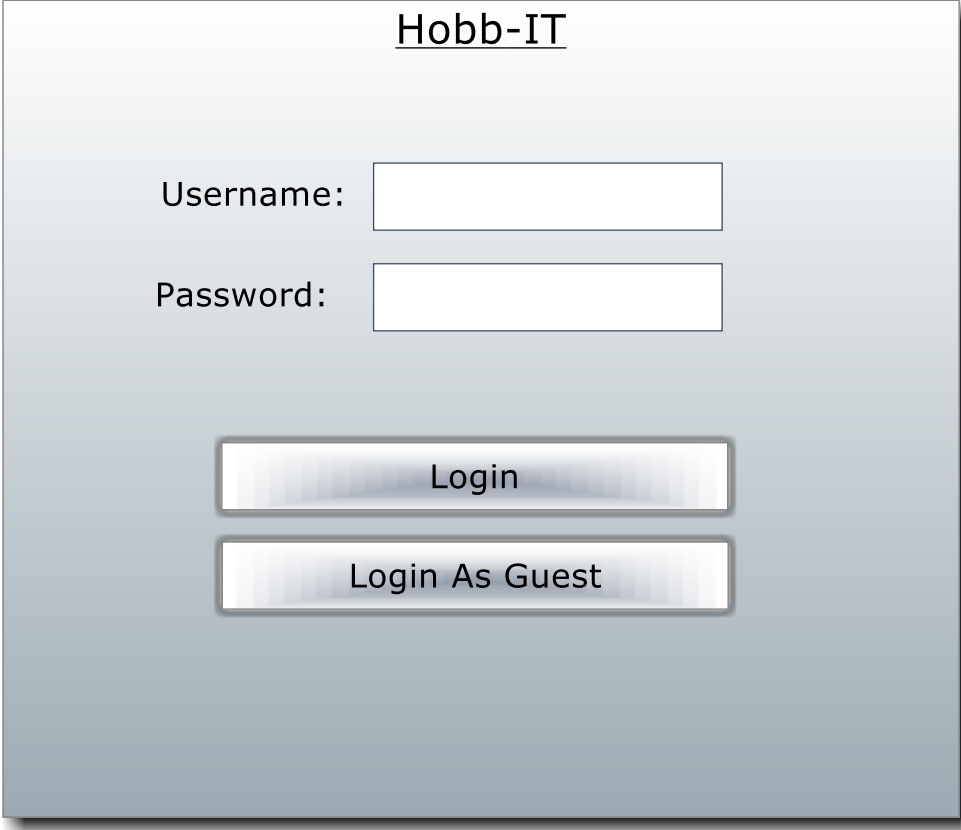
        }
        catch(Exception e){
            e.printStackTrace();
        }
    }
}
```

The Result (10/22/13):

Card name = Hellfire  
Edition = Legends  
Condition = NM  
Price = 14.99  
Quantity = 6

## 1.6.2 External Interface Prototypes

### Main Menu Screen:



The image shows a prototype of the Main Menu Screen for Hobb-IT. It features a light blue gradient background. At the top center, the text "Hobb-IT" is displayed in a bold, black, sans-serif font. Below this, there are two input fields: "Username:" followed by a white rectangular box, and "Password:" followed by another white rectangular box. Below the password field, there are two buttons. The first button is labeled "Login" and the second button is labeled "Login As Guest". Both buttons have a 3D effect with a gradient and a shadow.

The purpose of this page is to force the user to pass login qualifications or interact with the system as a guest. Our system allows three different users, the administrator, guest user and advanced user each with different functionalities. This page will determine the functionality the user will have access to once the user logs in. The user must input their unique username and password that the user registered with, which will be processed once the login button has been pressed. If the user puts in the correct username and password, the user will be allowed beyond the main menu screen to the advanced user welcome screen. If the user is the administrator account, the administrator will be redirected to the administrator welcome screen. If the user does not have an account and presses the “Login As Guest” button, the user will be redirected to the guest user welcome screen.

## Guest User Functions

### Guest User Welcome Screen:



Enter a Magic: The Gathering card you would like to price:

Magic Card:

Website:

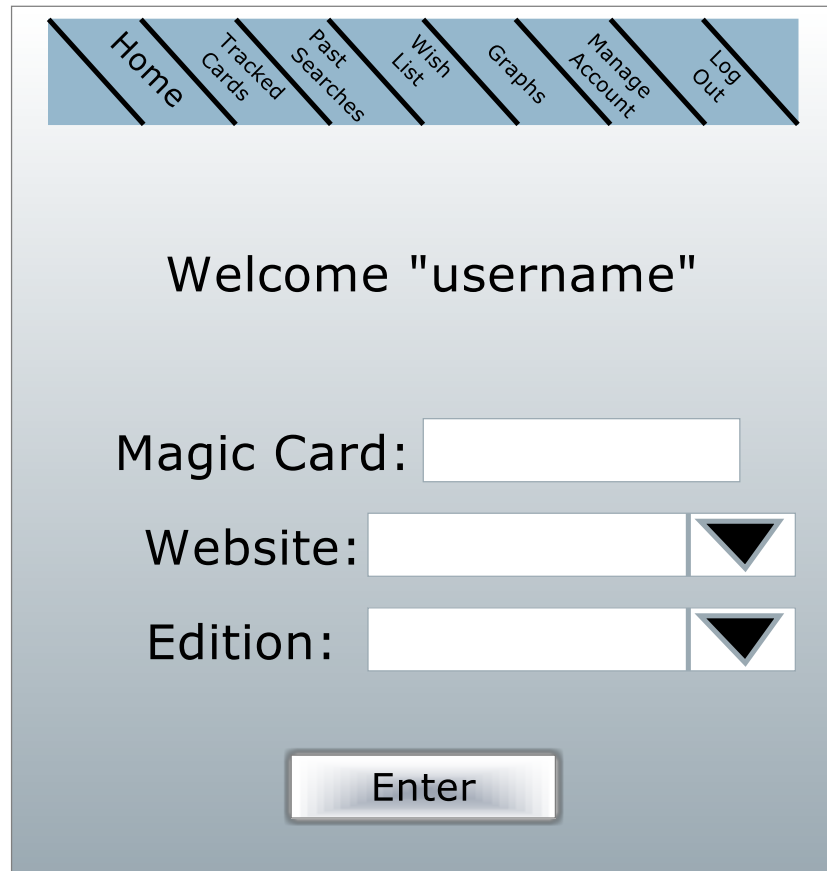
Edition:  

If a user wishes to interact with the system as a guest user this is the first screen the guest user will see. The guest user then has the option of typing in the name of a specific magic card. The guest user will input the edition of the card the guest user is searching for. Once the guest user hits “Enter”, the guest user will be redirected to a screen which will display the real time price of the card which the system just took as input.



## Advanced User Functions

### Advanced User Welcome:

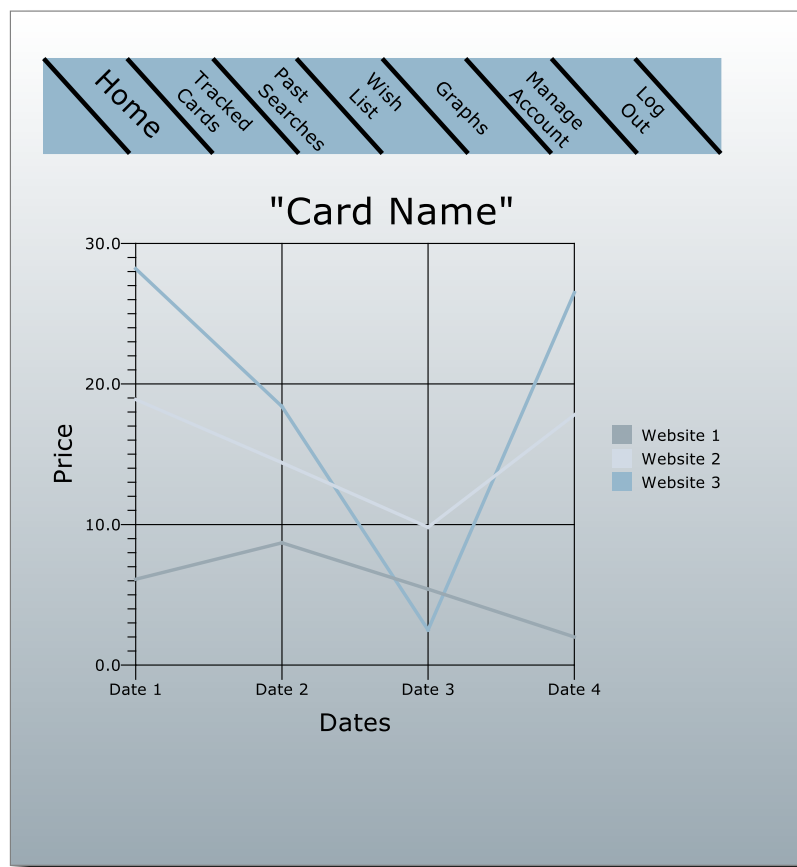


The image shows a mockup of the 'Advanced User Welcome' screen. At the top, there is a navigation bar with seven buttons: 'Home', 'Tracked Cards', 'Past Searches', 'Wish List', 'Graphs', 'Manage Account', and 'Log Out'. Below the navigation bar, the text 'Welcome "username"' is displayed. Underneath, there are three input fields: 'Magic Card:' followed by a text box, 'Website:' followed by a text box and a downward-pointing triangle (dropdown menu), and 'Edition:' followed by a text box and a downward-pointing triangle (dropdown menu). At the bottom center, there is a button labeled 'Enter'.

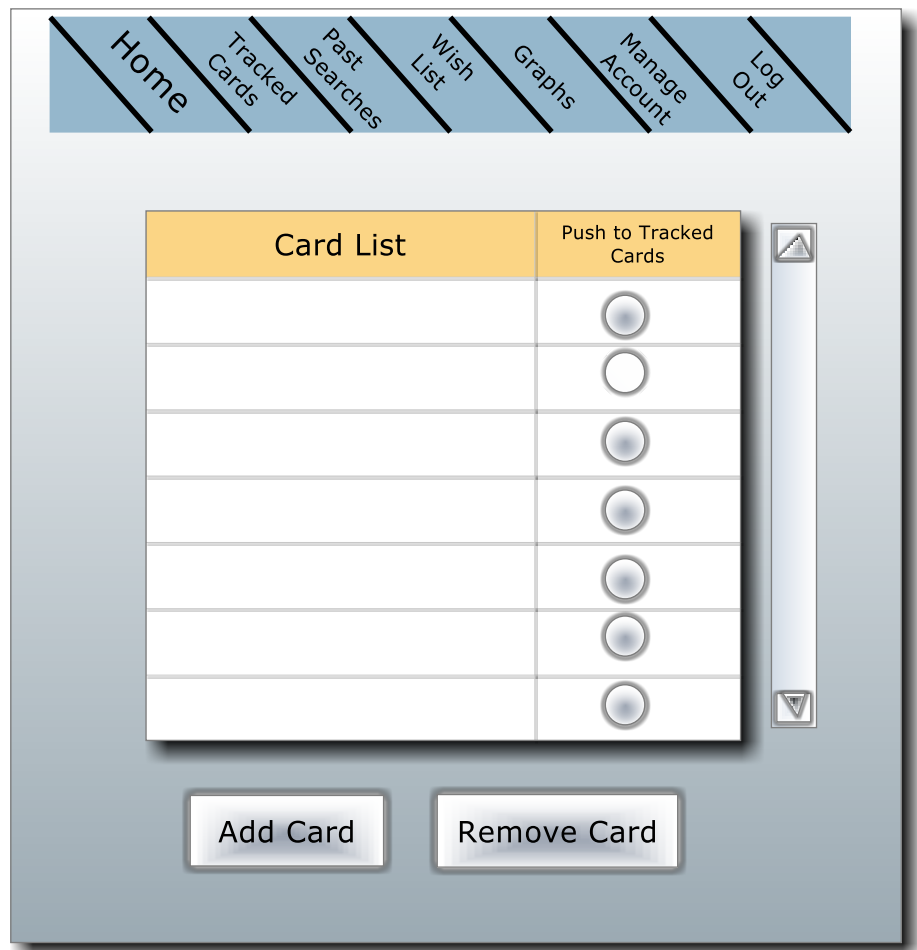
After the advanced user has been authenticated the advanced user will be directed to advanced user home screen. Along the top of the home screen there is a navigation bar to let the user employ the different functions associated with their account. At any time, if the advanced user hits the home button on the navigation bar the advanced user will be redirected back to the home screen. Like a guest user, this screen will allow the advanced user to type in the name of one specific MTG card. The advanced user must use a drop down tab to select from the list of tracked websites and edition of the card the advanced user would like to view. Once all of these criteria have been fulfilled, the advanced user may press enter and view the real time price of the card selected.

Initial Graphs Screen:The image shows a web application interface for the 'Initial Graphs Screen'. At the top, there is a navigation bar with seven items: 'Home', 'Tracked Cards', 'Past Searches', 'Wish List', 'Graphs', 'Manage Account', and 'Log Out'. The 'Graphs' item is highlighted. Below the navigation bar, the main content area has a light blue background. It starts with the text 'Enter the card you want to visualize:'. Below this text, there are two input fields. The first is labeled 'Magic Card:' and is a text input field. The second is labeled 'Edition:' and is a dropdown menu with a downward-pointing arrow. Below these input fields, there is a button labeled 'Enter'.

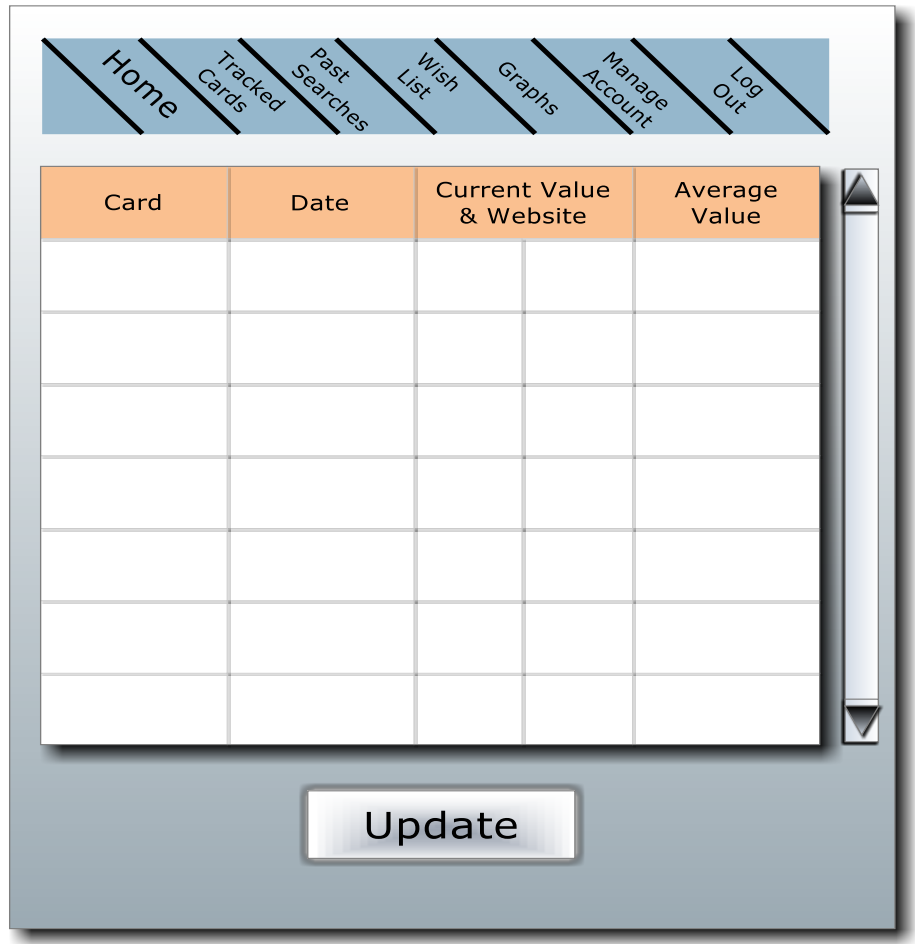
The initial graphs screen will be viewed if the advanced user selects “Graphs” from the navigation bar. The advanced user must type in a *MTG* card as well as select a corresponding edition from the drop down tab. The advanced user must select a card, which they have already been tracking. By hitting the “Enter” button, the input will be verified. If the advanced user has correctly entered in a tracked card and hits “Enter”, the advanced user will be directed to the visualized graph screen.

Visualized Graph Screen:

The Visualized Graph Screen shows the information that will be visualized once an advanced user has correctly entered in a tracked *MTG* card in the initial graphs screen. The graph shows the change in price between different websites over a period of time for one *MTG* card. The time frame will be from when the advanced user first tracked the card to the most recent site scraping.

Wish List:

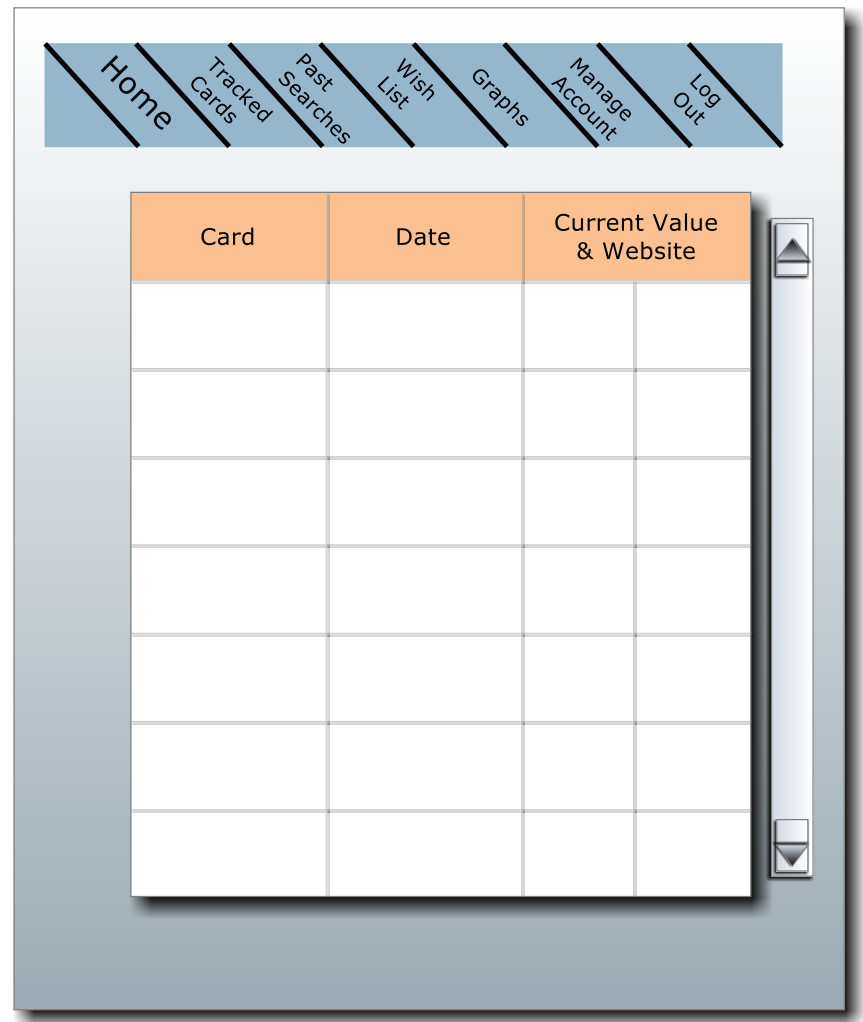
The Wish List screen will be shown when an advanced user selects the “Wish List” from the navigation bar. The card list column is composed of any *MTG* cards the advanced user one day will hope to track. By selecting the button located in the row next to a *MTG* card, that card will automatically be moved onto the advanced user’s tracked cards’ list. Any card may be removed or added from the wish list by pressing either the “Add Card” or “Remove Card” button. If either of these buttons is pressed, the advanced user will be prompted to type in the card the advanced user wish to add or remove.

Tracked Cards List:

| Card | Date | Current Value & Website |  | Average Value |
|------|------|-------------------------|--|---------------|
|      |      |                         |  |               |
|      |      |                         |  |               |
|      |      |                         |  |               |
|      |      |                         |  |               |
|      |      |                         |  |               |
|      |      |                         |  |               |
|      |      |                         |  |               |

Update

This screen will be shown when an advanced user chooses the “Tracked Cards” button from the navigation bar. For a card to be added to the tracked cards list, the card must be selected from the wish list. This page will show the most recent data collected from all of the websites Hobb-IT tracks for the cards the advanced user added to the tracked cards list. The first column will display the *MTG* card. The next column will display the date which the data was collected. The next column will show the lowest real-time price of the *MTG* card and the website the price was collected from. The final column will display the average price collected from all of the websites Hobb-IT has parsed for that specific card. At any time the advanced user can collect the most recent information by clicking the “Update” button.

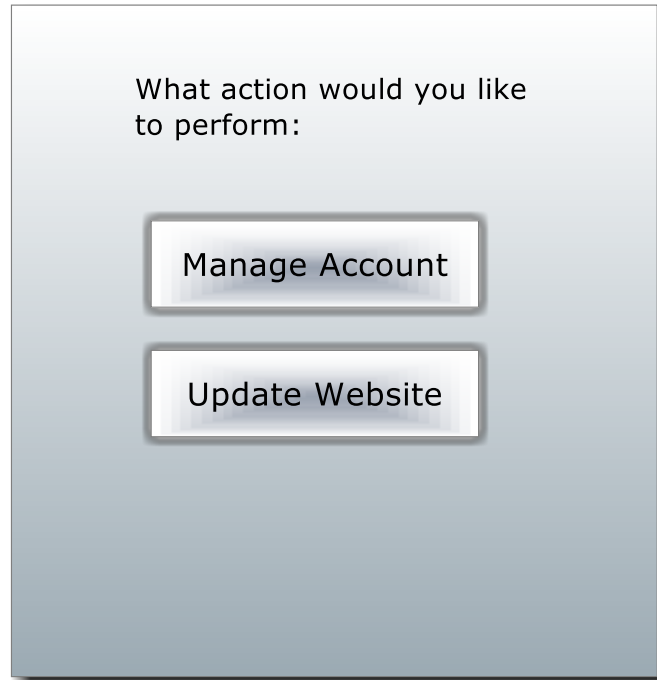
Past Searches:

| Card | Date | Current Value & Website |  |
|------|------|-------------------------|--|
|      |      |                         |  |
|      |      |                         |  |
|      |      |                         |  |
|      |      |                         |  |
|      |      |                         |  |
|      |      |                         |  |
|      |      |                         |  |

The Past Search screen can be accessed when an advanced user selects the “Past Searches” button on the navigation bar. This screen will display all of the past searches performed by this advanced user. The first column will display the *MTG* card that was searched. The second column will display the date that the search was performed. The third column will display the current value of the *MTG* card and the website the price was retrieved from.

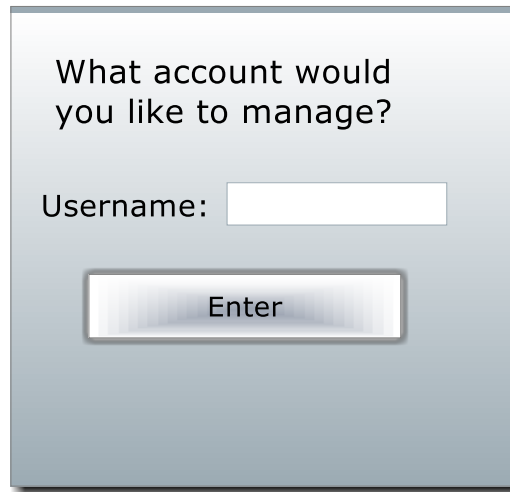
## **Administrator Functions**

### **Administrator Welcome Screen:**



If an administrator is authenticated through the log in screen, the administrator will be redirected to the “Administrator Welcome Screen”. The two functions available are to manage an account and update a website template. If the administrator clicks either button, the administrator will be redirected to a new screen associated with that function.

### Manage Account Screen:



What account would you like to manage?

Username:

The administrator can manage all other advanced user accounts. If the administrator types in the username of an advanced user and presses the “Enter” button, the administrator will be allowed to manage the advanced user’s information.

### Update Website Screen:



Please choose a Website to update:

The administrator will be able to update how a website is parsed by Hobb-IT. Using a drop down menu, the administrator can select one of Hobb-IT’s tracked websites and be redirected to the source code in order to make modifications.



### 1.6.3 Conclusions

Illumination Technologies concluded that multiple websites can have their html parsed to obtain the *five attributes* needed as part of Illumination Technologies' requirements. Illumination Technologies has also concluded that there will be a variety of interactions, such as button, scroll bars, text boxes, and drop down menus, to achieve the functionality requested by the client. Hobb-IT will also include tables and graphs to display the parsed data in an organized fashion.

## 1.7 Functional Requirements Inventory

### General

- Hobb-IT will be compatible with current versions of Chrome, Firefox, Internet Explorer, Safari, and Mobile Safari.

### Administrator

- Will be able to access all stored data on the database.
- Will be able to access the search history of all users.
- Will be able to approve usernames and passwords of new Advanced User accounts.
- Will be able to change how a website's data is parsed into the database.
- Will be able to view and change login credentials of all users.
- Changes default website that guest user will be able to real time prices for cards

### Advanced User

- Will be able to login to Hobb-IT using a username and password approved by the Administrator.
- Will be able to search for the real-time price of a *Magic: The Gathering* card from any tracked website.
- Will be able to save a list of tracked *Magic: The Gathering* cards.
- Will be able to save a list of purchased *Magic: The Gathering* cards.
- Will be able to save a list of *Magic: The Gathering* cards the user wishes to track in the future.
- Will be able to edit the list of *Magic: The Gathering* cards.
- Will be able to access the search history associated with the Advanced User's account.
- Will be able to view a visual representation of the fluctuations in prices of a tracked *Magic: The Gathering* card.

### Guest User

- Will be able to access Hobb-IT without login credentials.
- Will be able to view the real-time price and condition of a *Magic: The Gathering* card from site specified by administrator. By default the website will be *ToadandTroll.com*

## 1.8 Non-functional Requirements

- Hobb-IT will be easy to maintain and make the templates for each website.
- Hobb-IT will be efficient.
- Hobb-IT will be stable.
- Hobb-IT will be user friendly.
- Hobb-IT will follow the legal processes on all websites tracked.

## 1.9 Exception Handling

For Illumination Technologies' purposes, we will consider an exception to be something that happens during the execution of Hobb-IT that causes the system to stop running. In these cases, Illumination Technologies will need to use an exception handler. Examples of exceptions are, but not limited to, the website that is scraped is down, the website changes how the information is displayed, the specific *MTG* card searched for is not available on the searched website, or the *MTG* card that is searched for by the user is not in Illumination Technologies' database. In any case, Illumination Technologies will handle the software exceptions in an appropriate manner once the level of software used is determined.

## 1.10 Implementation Priorities

Illumination Technologies will work to make sure that all the functional requirements are met, but the following requirements have been decided as priorities:

- The ability for the system to properly scrape and parse the websites provided.
- The ability to see the real time price for any *MTG* card searched from the list of websites.
- The ability for an advanced user to save and modify lists of *MTG* cards the advanced user is tracking or wishes to track.
- The ability to display the price fluctuations of tracked *MTG* cards for the advanced user.

## 1.11 Foreseeable Modifications and Enhancements

At this time, the client does not see any modifications or requirements that are needed of Hobb-IT outside the list of functional requirements. One future modification Illumination Technologies may implement is the ability to recommend a good time to buy a tracked *MTG* card based on price fluctuation data. Another future modification that Illumination Technologies may implement is the ability for the administrator to add new websites to the list of parsed sites. If any other modifications or enhancements arise as development of the software progresses, Illumination Technologies will work to meet the needs of the client and the modifications will be addressed at that time.

## 1.12 Testing Requirements

Illumination Technologies will test each unit of Hobb-IT throughout development to ensure that each part is working properly. Along with this testing, there will also be system tests that ensure each unit interacts correctly with other units, and that the system is stable.

### **1.13 Acceptance Criteria**

For the final software, there will be an acceptance test that checks which of the requirements were met and which requirements were not met. Illumination Technologies will be able to provide good reasons to the client for not meeting any of the requirements. In particular, non-functional requirements will also be evaluated, but since there are no formal tests measuring these requirements, these will be reasonably evaluated by the members of Illumination Technologies as well the client.

### **1.14 Design Hints & Guidelines**

Hobb-IT will use Java 6 to perform functional tasks within the system and PHP 5 to create a web interface for the users. These two parts of the system will work in conjunction with each other through a Database Management System. Furthermore, Illumination Technologies has looked at the Java library named Jsoup to create website templates in order to handle, parse, and manipulate HTML to retrieve the information necessary for the client. Once an administrator has edited a particular website's template, the Java code will change the way the website parses information based on the new template.

# Appendices

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## B. Sources of Information

- Troll and Toad ([trollandtoad.com](http://trollandtoad.com))
- Dave and Adam ([dacardworld.com](http://dacardworld.com))
- Card Kingdom ([cardkingdom.com](http://cardkingdom.com))
- Titan Collectables ([titancollectables.eocrater.com](http://titancollectables.eocrater.com))
- Black Boarder ([blackboarder.com](http://blackboarder.com))
- Channel Fireball ([store.channelfireball.com](http://store.channelfireball.com))
- Old School Gaming ([oldschoolgaming.net](http://oldschoolgaming.net))
- C&C Games ([ccgames.net](http://ccgames.net))
- White Lion Games ([whiteliongames.com](http://whiteliongames.com))
- The Collector's Friend ([tcf.cc](http://tcf.cc))

## C. Glossary of Terms

Administrator: A singular user of Hobb-IT defined in the User Case Narrative

Advanced User: A user of Hobb-IT defined in the User Case Narrative

Chrome: A web browser created by Google Inc.

DFD: **Data Flow Diagram**; A representation of how data will move and interact throughout a system

Firefox: A web browser created by Mozilla Foundation

Guest User: A user of Hobb-IT defined in the User Case Narrative

Hobb-IT: **Hobby Information Tracker**; The name of the project

HTML: **HyperText Markup Language**; A markup language used to structure website pages

Internet Explorer: A web browser created by Microsoft Inc.

Java: An object oriented programming language owned and developed by Oracle Corporation

Magic Card: A paper card from the game Magic: The Gathering

MTG: **Magic: The Gathering** ; a card game created by Richard Garfield published by Wizards of the Coast

Mobile Safari: A web browser used on Apple's iOS mobile devices (ex. iPhone, iPad , iPod Touch)

PHP: **PHP Hypertext Preprocessor**; a recursive acronym, it is a server side language generally used to generate HTML and CSS code.

Jsoup: A Java library written to work with real word html applications such as extracting and manipulating data from web browsers.

Safari: A web browser created by Apple Inc.

UML Use Case Diagram: A diagram created to represent user's interactions with a system.

Web Parsing: The process of breaking the information on a website page into a more usable format

Web Scraping: The process of retrieving information on a website page

## D. Gantt Chart

