Figure 1: gxt

Martin Nestorov ____________________

INF 335 Web Server Technologies

“I hereby declare that the submitted project is all my own work. I did not copy the software from someone or somewhere else. No one but me developed the software.”

Signatute ____________________

Architecture

The architecture of the project follows a basic MVC pattern, where there are specific classes and files that handle only the **view** of the *app*, some which only interact with the **model**, and those that are concerned with **controlling** the two.

More specifically, from all of the files that build up this project, the *model* files (pdo.php, catalogue.php, client.php, promo.php, redirect.php) have a direct connection with the MySQL Database, allowing for the app to have a nice separation from that data, making it **less state-full**.

The purely *view-oriented* files are two types, those which contain only css code, and those that are somewhat intertwined with the controller part of the app. These are the index.php, indexstyle.php, cartstyle.php, loginstyle.php, login.php, and register.php.

An interesting part of the project is the *controller*. Since this is PHP, the controller is the one that makes the model and the view play nice, but because of some limited capabilities of the language, the controller was, to some extent, used as a view as well. Most of the controller files (register.php, login.php, showCart.php, showCatalogue.php, showPromo.php, showGetLucky.php) both load and manipulate the data in some way to look good, but they also get the data from the model.

```
// pdo.php
<?php
$servername = "127.0.0.1";
$dbname = "garden_x_travaganza";
$dsn = "mysql:host=$servername;dbname=$dbname";
$user = "martin";
$pass = "me4kaikop4e";

$conn = new PDO($dsn, $user, $pass);
// set the PDO error mode to exception
$conn->setAttribute(PDO::ATTR_ERRMODE, PDO::ERRMODE_EXCEPTION);
?>

// client.php
<?php
class client {

    function __construct($db) {
        $this->db = $db;
    }

    function get($name) {
        try {
            $sql = "SELECT * FROM users WHERE username='".$name."'";
            $stm = $this->db->prepare($sql);
            $stm->execute(array($name));
            return $stm->fetchAll()[0];
        } catch (PDOException $pdoe) {
            echo "<br>Could not fetch user ".$name."<br>".$pdoe->getMessage();
        }
    }

// login.php
<?php
require "pdo.php";
require "client.php";
require "redirect.php";

session_start();
```

From this snippet here we can see how we have a model, which is loaded by a controller, and the passed onto a view, for the data to be displayed. The client class is the mode, where together with the pdo, it issues **prepade** SQL statements. The result is handled by a controller, which is then applied to some HTML.

Implementation in detail

The project was quite big to begin with, so it took a lot of time to create. Although the application isn't as complex as it can be, there are a few tricky parts, which I had to overcome.

Login and Registration

The login and registration act in this way. Some client navigates to any url that is part of the application domain, and if that client is not authorized, via a *session variable* called $_SESSION['authorized'], then he/she is redirected to the login page. There, a user can either register or just login.

If a registration is issued, there are a few things that happen. First the *user name* is checked that it is *unique*. If it is not, the client is notified and he/she can try again. Otherwise, the new user name and password are stored in the Database. The password is **encrypted** using a *built-in function* of PHP to securely encrypt data:

```
$newUser;
$hashed_password;
if (isset($_POST['newUserName']) && isset($_POST['newPasswd'])) {
    $newUser = $_POST['newUserName'];
    $hashed_password = password_hash($_POST['newPasswd'], PASSWORD_DEFAULT);
}
```

After that, the client is redirected to the index.php page.

If the client just logs-in, again a few things are happening. First the *username* and *password* are extracted from the Database and compared with the input ones. If the user is not part of the database, the client is notified and he/she can go and register. After the user is retrieved, again through another built-in PHP method, the input password and the encrypted one are compared to verify the client:

```
// Checks that the user password is a valid hash of the saved passwrd in the DB
if(password_verify($userPass, $user['password'])) {
    $_SESSION['authenticated'] = true;
    redirect("index.php");
}
```

Because we are retrieving and sending data to the database, it is important to mention that throughout the whole project, a simple build pattern is used to connect to the database. This is done through a single pdo object, which is in it's own file pdo.php. Then all files that wish to use that object, simply need to include/require that file. Then that singleton is plugged into a class that can issue SQL queries to the database. There classes, as already mentioned, are client.php (client), catalogue.php (catalogue), and the promo.php (promo).

NOTE: It's important to mention that these input forms are both made *sticky* and with basic input validation. Of course the database connection has another layer of input validation.

```
<input type="text" name="userName" class="login-field" value="<?php if (isset($_POST['us

<input type="password" name="passwd" class="login-field" value="" placeholder="password'
```

Main page and functionality

After a successful login/registration, we are redirected to the *main splash* page, which consists of 3 buttons. We can checkout the catalogue, go look for some lucky deals, or enter in a promo code.

The first two options work almost exactly the same, in that they have a very similar, if not, identical functionality, but they interact with different data, which gets tricky. The hardest part about this was that I had to maintain two states for the two types of products that are being bought. On one side we have normal goodies, but on the other, some are with a discount. which means that in the end, the cart has to manage both things in sync.

Although this was a challenge, and the code got bloated a bit from all of the array handling, the cart handles all types of user bought products, both on a discount and on full price!

Here I want to mention that the get lucky functionality just takes in some *random amount of items* from the database, implemented with SQL, and then *randomly* reduces the prices of these products. The client has full freedom on what he/she want's to buy.

Promo codes

The last part of the functionality of the project are the **promo** codes. They are pretty cool in my opinion, because this part of the application connects to another table in the database and checks a special code. The code is actually a **version 4 UUID** number, which by itself is pretty unique. For each one item type in the database, there is one promo code. If the entered code is correct, then that item is given for *free* to the user, as a promotion of the store!. Why did I choose for that item to be free? Because reducing the price was already implemented and I didn't want things to get boring.

Again, these inputs are maintain by basic validation, until they reach the SQL validation, and have a *sticky* form for it.

The Cart

The final part of the project is the cart. This was maybe the most difficult thing, apart from the design, that I had to do. Because I have 3 types of purchases - *normal*, *promoted*, and *reduced in price*, the cart had to be in perfect **synchronization** with everything.

After some trial and error, I decided that the reduced and normal items should be in a single table, and the promoted items, will be just below so a user can easily tell things apart.

```php
// Get normal cart items
$cat = new catalogue($pdo);
$cartSet = $cat->getSetOf($_SESSION['cart']);
$itemsCount = array_count_values($_SESSION['cart']);
$allItems = array();
foreach ($cartSet as $cs) {
    foreach ($itemsCount as $i => $c) {
        if ($cs['item'] == $i) {
            $allItems[] = [$c => $cs];
        }
    }
}
```

One of the most difficult things in the project was the fact that arrays in PHP don't act like normal arrays, and the dynamic binding on every datatype made things even worse, but that was mostly on my fault.

```php
// Make the lucky items unique array so that there are no duplicates in the table
$temp2 = array();
foreach ($_SESSION['luckyCart'] as $lc) {
    foreach ($lc as $item => $price) {
        if (!in_array($item, $temp2)) {
            $temp2[$item] = $price;
        }
    }
}
```

Another hard part of the project was dealing with the sessions. Since sessions have a shared state, and they keep information in the browser, some of the time, I didn't know if the code I was changing, was really being loaded, since the browser kept a previous state about things. This led to some undefined behavior at some point, but in the end, I managed to get on top!

Bonuses

The Database

Since the whole project was created in a local environment, some additional steps had to be made. For one, I had to install my own apache server, which had to run and execute PHP code. That alone took quite some time to get going. After that I installed MariaDB, one of many implementations of MySQL, and then I populated my database.

I kept a record of all of the SQL statements I had to run in order to complete this. It's located in a statements.sql file in the project. Here are a few:

```sql
-- Step 0.
-- Create a user with privileges to a database.
CREATE user 'martin'@'localhost' IDENTIFIED BY 'me4kaikop4e';
GRANT ALL PRIVILEGES ON *.* TO 'martin'@'localhost';
FLUSH PRIVILEGES;

-- Step 1.
-- Create a database and use it.
CREATE DATABASE garden-x-travaganza;
USE garden_x_travaganza;

-- Step 2.
-- Create tables.
```

```sql
CREATE TABLE users (username TINYTEXT, password TEXT);
CREATE TABLE catalogue (item TINYTEXT, id INT, price FLOAT(255, 3) unsigned,
description LONGTEXT, imgpath TINYTEXT);
CREATE TABLE promo (code VARCHAR(50), item TINYTEXT);

INSERT INTO catalogue (item, id, price, description, imgpath)
VALUES("Leather Garden Gloves", 456025, 11.98, "Breathable 4-way stretch spandex back
helps reduce hand fatigue and keeps hands cool. Touch screen capabilities on the index
finger. Adjustable hook and loop wrist helps keep unwanted dirt and debris out of the
glove.", "/gloves.jpg");
INSERT INTO catalogue (item, id, price, description, imgpath)
VALUES("Hand Tool Kit", 748596, 59.95, "Gardener seat and tools. Sturdy, lightweight
and portable. Tool pockets on exterior of storage tote.", "/kit.jpg");
INSERT INTO catalogue (item, id, price, description, imgpath)
VALUES("Bulb Auger", 418503, 14.98, "Dig holes up to 22 inches deep and 2-3/4 inches
wide. Just insert into any 3/8 inch or larger drill.", "/auger.jpg");

INSERT INTO promo (code, item) VALUES("6daee431-5882-416b-b60a","Sledge Hammer");
INSERT INTO promo (code, item) VALUES("3b632813-6b36-4563-bf16","Hedge Trimmer");
INSERT INTO promo (code, item) VALUES("d55f2ce8-33ba-43cf-bb19","Root Assassin Shovel")
INSERT INTO promo (code, item) VALUES("6f931dc4-b79e-42d7-bc92","Bypass Hand Pruner");
INSERT INTO promo (code, item) VALUES("bb4f918a-a0df-4081-b5e9","Steel Camp Axe");

-- Plumbing commands --

-- Just get everything.
SELECT * FROM tablename;

-- Remove table entries.
DELETE FROM users WHERE username='XXXX';

-- Update table column data types.
-- This is just an example on how to modify a column data type.
ALTER TABLE users MODIFY username TINYTEXT;

-- Show the details of a table.
SHOW FIELDS FROM table_name;

-- Update a specific column value of a table;
UPDATE catalogue SET imgpath='/assets/hedge_trimmer.jpg' WHERE item='Hedge Trimmer';
```

This whole procedure was both fun and challenging, since it was out of the scope of the requirements, but it wasn't something that stopped me in my tracks.

And of course, here is how some of the tables in my Database looked like:

```
MariaDB [garden_x_travaganza]> select * from promo;
+-------------------------+-----------------------+
| code                    | item                  |
+-------------------------+-----------------------+
| 6daee431-5882-416b-b60a | Sledge Hammer         |
| 3b632813-6b36-4563-bf16 | Hedge Trimmer         |
| d55f2ce8-33ba-43cf-bb19 | Root Assassin Shovel  |
| 6f931dc4-b79e-42d7-bc92 | Bypass Hand Pruner    |
| bb4f918a-a0df-4081-b5e9 | Steel Camp Axe        |
| 6a2b4397-c840-405f-ab8e | Bypass Lopper         |
| f8df22b9-3c66-4bf4-8007 | Steel Garden Rake     |
| 0743ac4d-3000-4bfd-84c7 | Steel Garden Pick     |
| 208d8de9-2896-4ffc-a27b | Leather Garden Gloves |
| 87c76eec-af33-4b79-a607 | Hand Tool Kit         |
| fbb27b4d-98e6-478f-b1e1 | Bulb Auger            |
+-------------------------+-----------------------+
11 rows in set (0.00 sec)
```

```
MariaDB [garden_x_travaganza]> select * from users;
+----------+--------------------------------------------------------------+
| username | password                                                     |
+----------+--------------------------------------------------------------+
| Martin   | $2y$10$sPRbNjkz9fye8tOPA.Nsq.PmvNsl.u3W8DjRUnJmE88ufnJr3bMiS |
| Olivia   | $2y$10$cED7bMQ8RFwFIhwLhJuRU.PpE2wFRICuAK.CWvUwPbYQr8OEiJ5L. |
| Nasko    | $2y$10$zzPlLr8NRjnS4YoolsJvwubHQZBLwAUhAGzXPt38B97w3Qwlr.NLe |
| Dani     | $2y$10$3D9lwLmeCIy.DN/GBYkaKugt0B2c.PPjsY7HuoH33Jh2O6U0XRM2u |
| Ivan     | $2y$10$dZ3DywUTUV7Oom9PAlbS2um2XTPwDCCN9oOqltuKozti3AzJv1LXm |
| Stefan   | $2y$10$VKRd7XBGxlPiZjQwcA1QKeY2nIP1uzhx/WjjeYZxpjv.zQDYQKXvm |
| Zaro     | $2y$10$4iLBx/ucOgTsAPQKPzODIOS.D/L.oimq12hmQY0UmZh5dRnwh0bA2 |
+----------+--------------------------------------------------------------+
8 rows in set (0.00 sec)
```

Styling

The hardest part of this whole project for me was the fact that I wanted to style things properly. All other problems were hard, but I knew that I can do it, but I am nowhere with design. I drew inspiration from so many places and spent so much time, just so I can make things visually appealing.

I say this only to complain that I am not a front-end developer :)

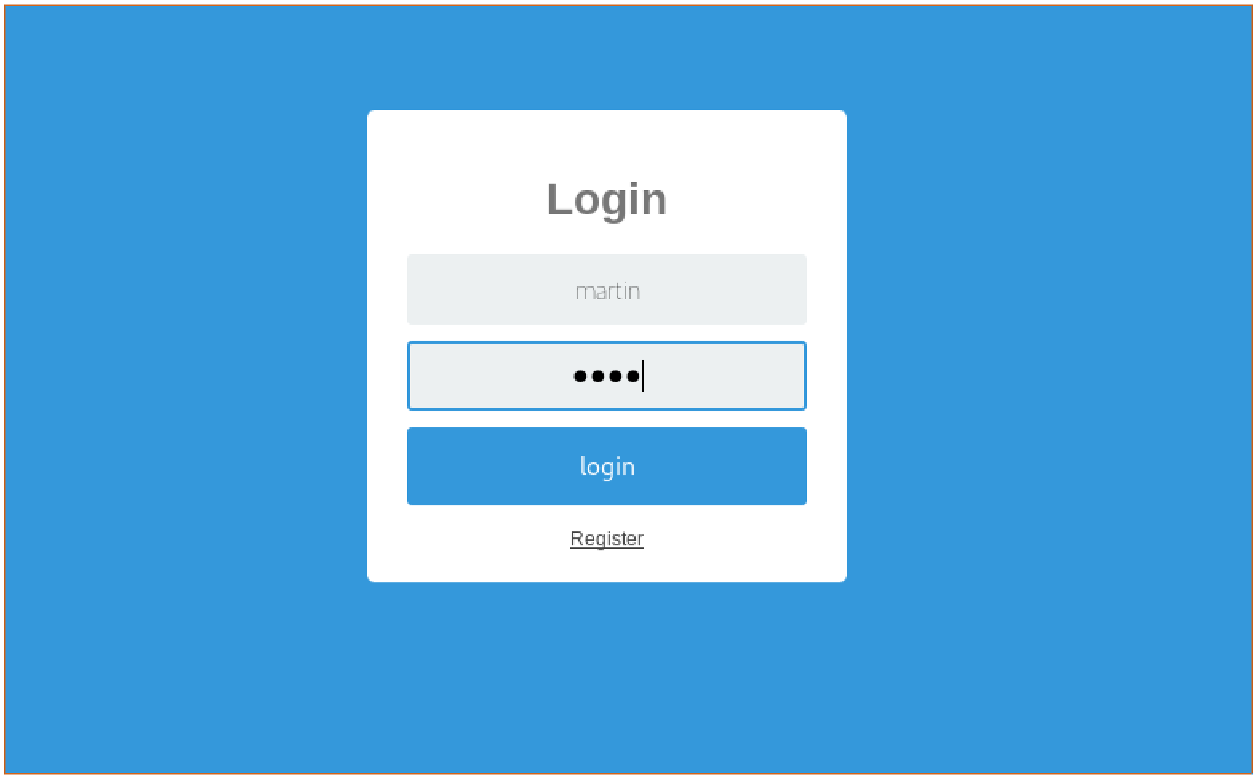


Figure 2: s1

Screenshots

This is how the normal login looks like.

The user is not allowd to enter an empty string, validated through the front-end.

The same thing happens with the registration. No invalid inputs are allowed, since they are checked in the DB and the front-end.

This is the index of the app, where we can navigate to several places, come back, and explore some more.

This is the normal catalogue, where all of the data we care about the items, is given to use. We can easily fill out cart with as many things as we want, and on top we can see how much things we have stored in the cart.

This is the listing of the cart, with a total sum. We can also see that there are no items which have been reduced in prices and put into the cart.

Here we can see some items which have been reduced in price and also put into the cart, We can tell that this has happened, since some of the prices seem like they have been reduced by a percentage.

And here we can see how the code input works, where it tells us that we have enterd the right code and that we can checkout our cart. There we can find we have one free

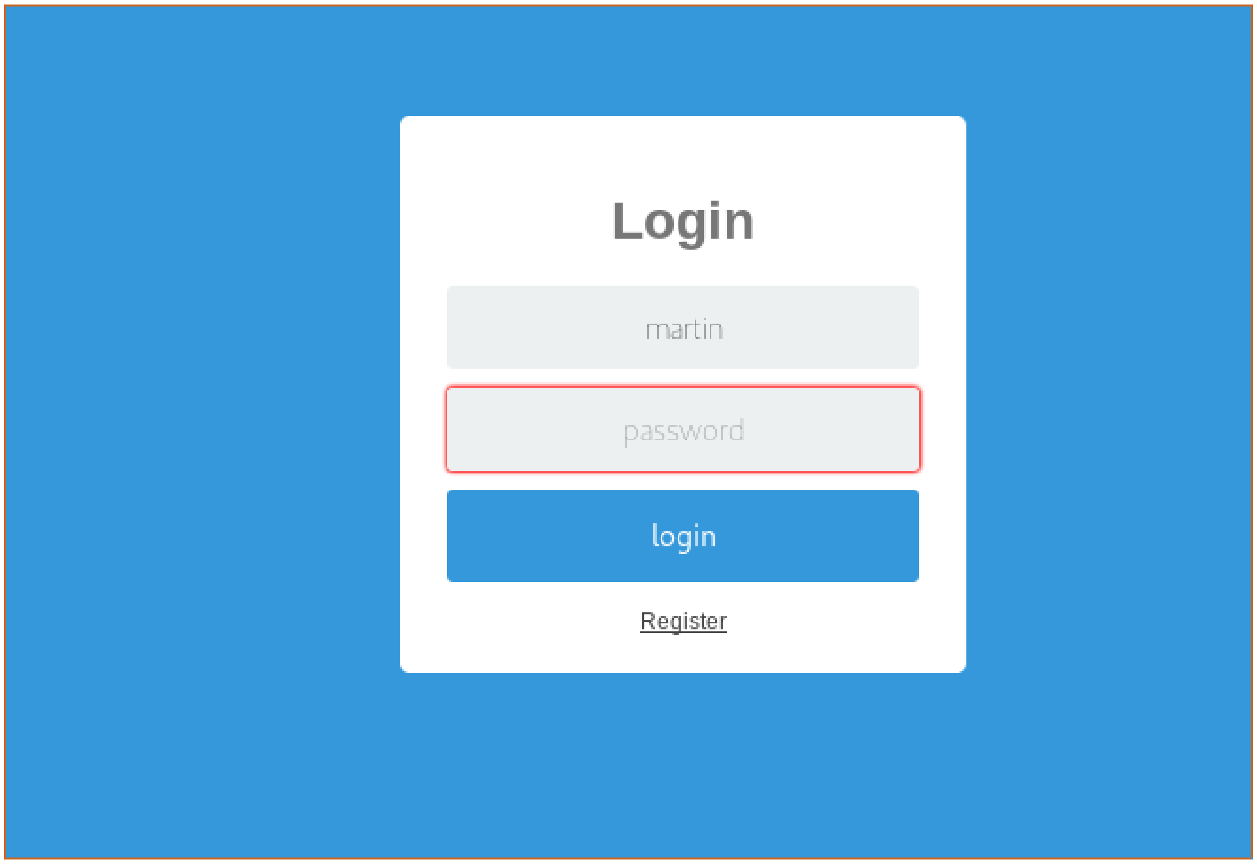
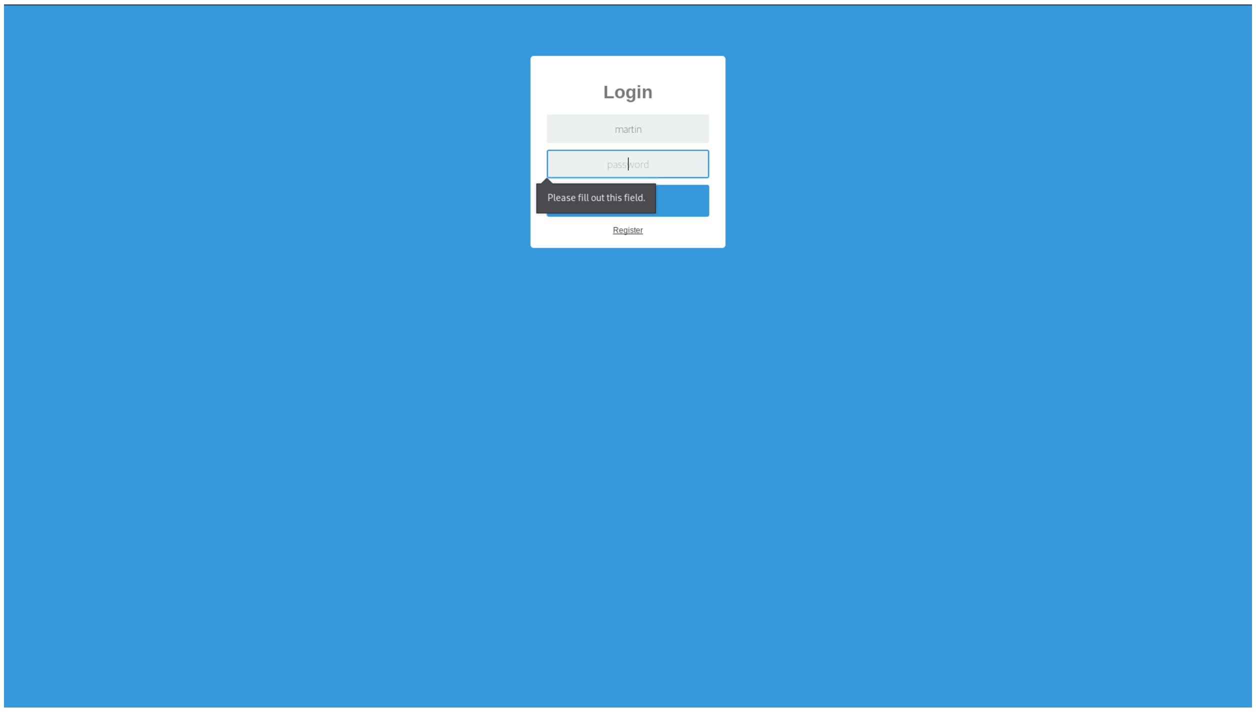


Figure 3: s2



Please fill out this field.

Figure 4: s3

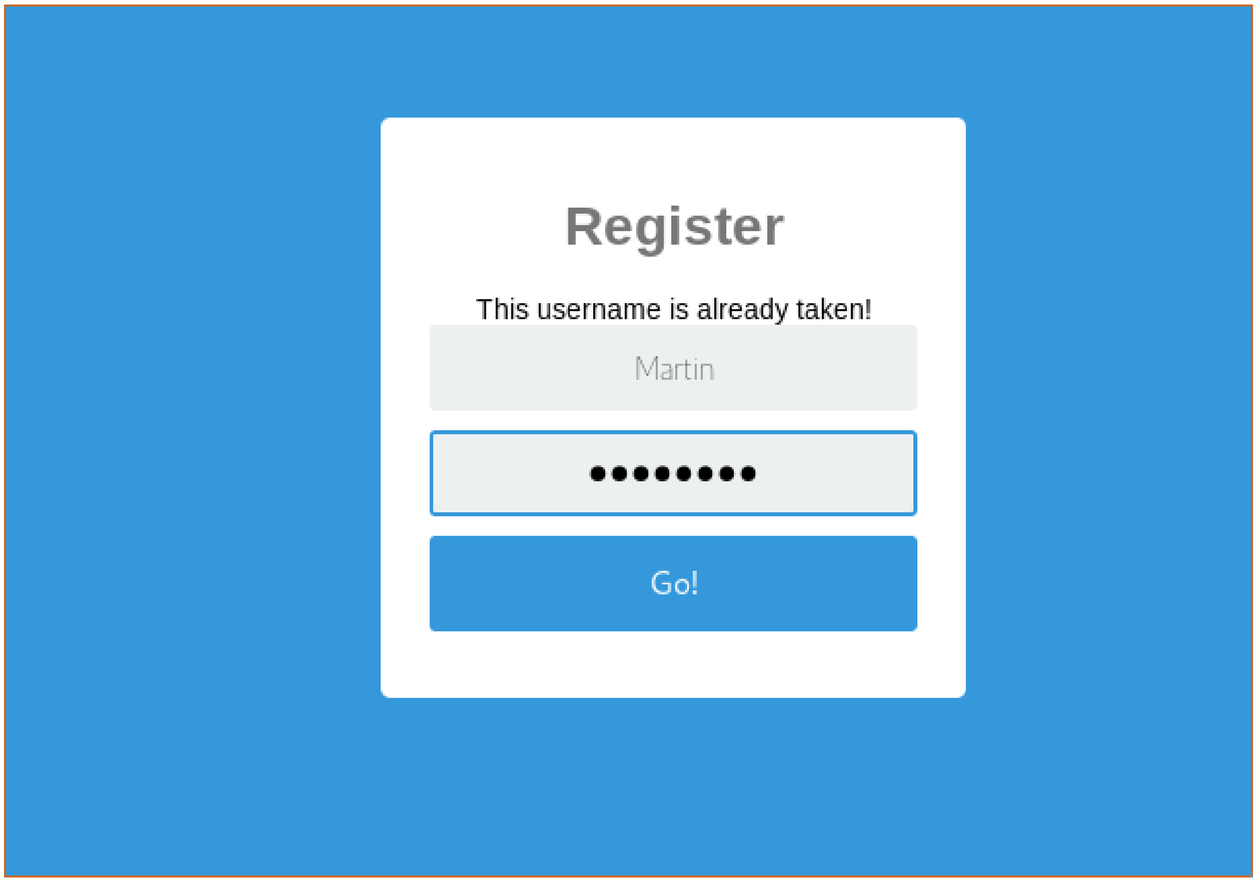


Figure 5: s4

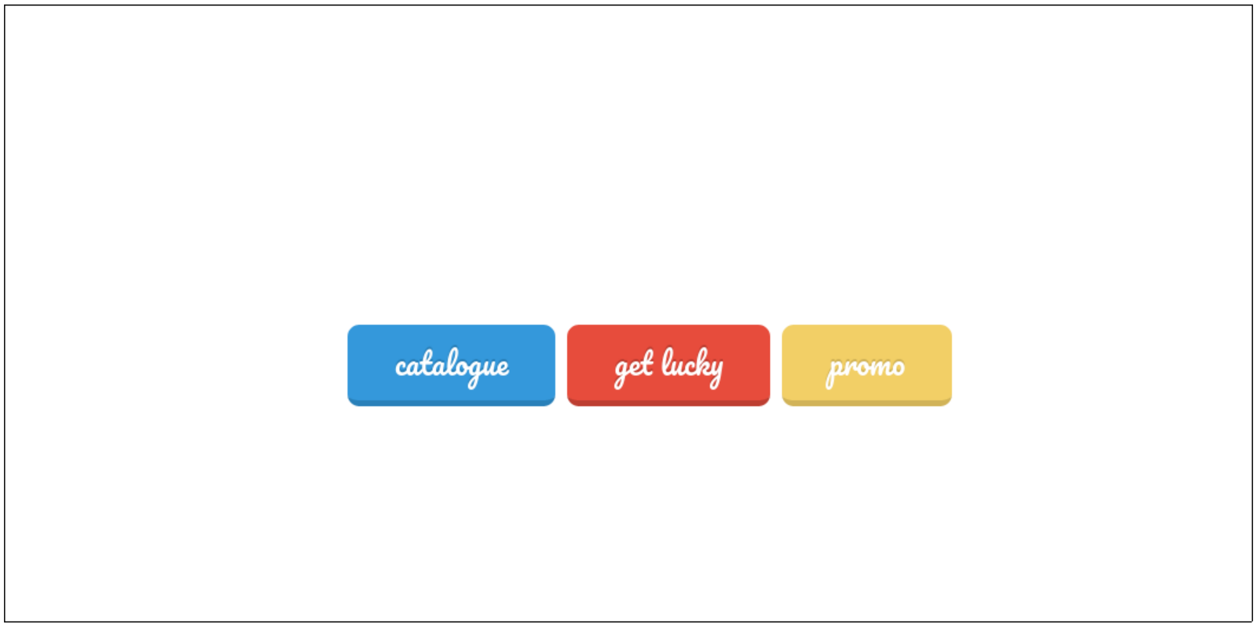
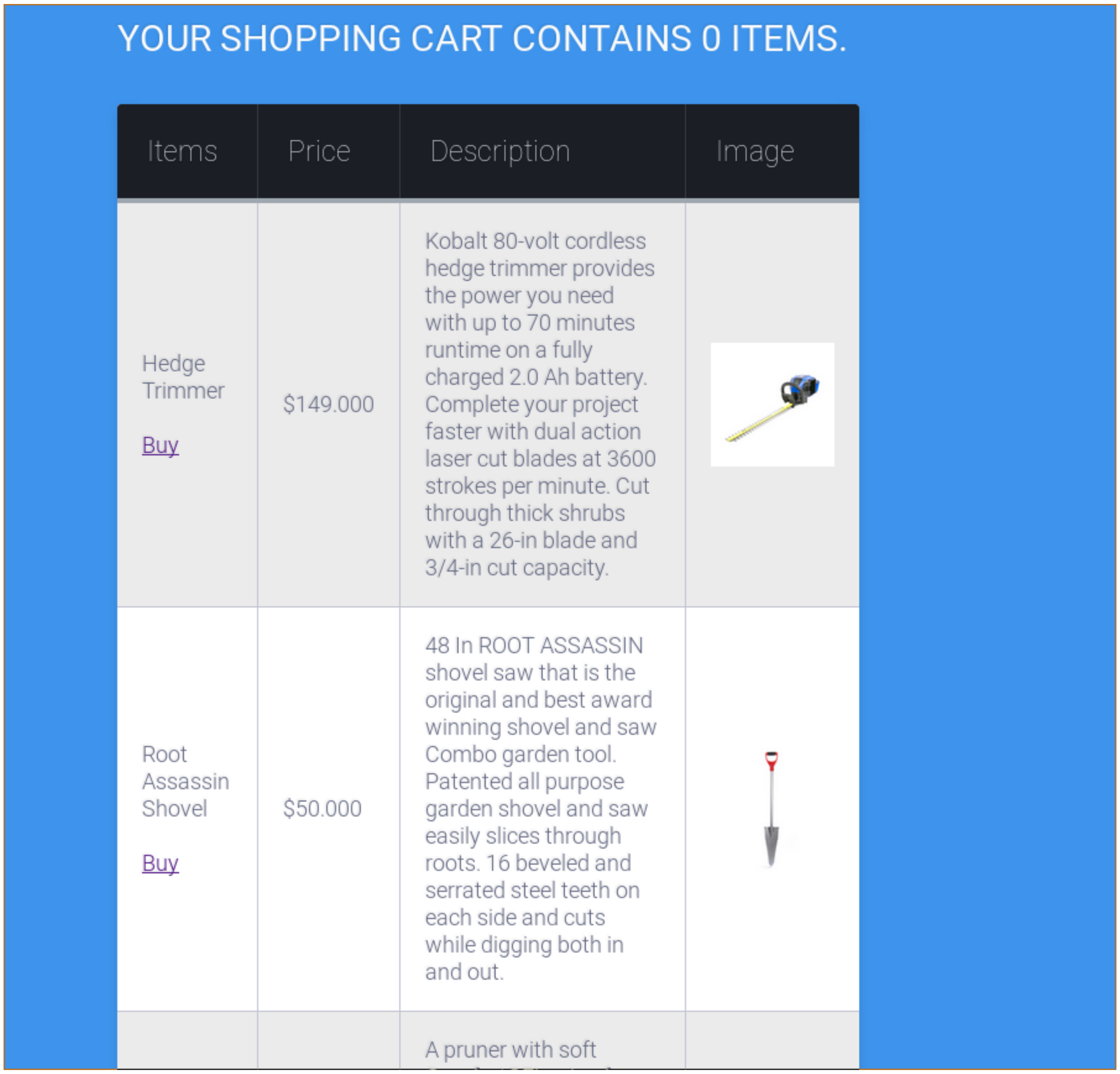


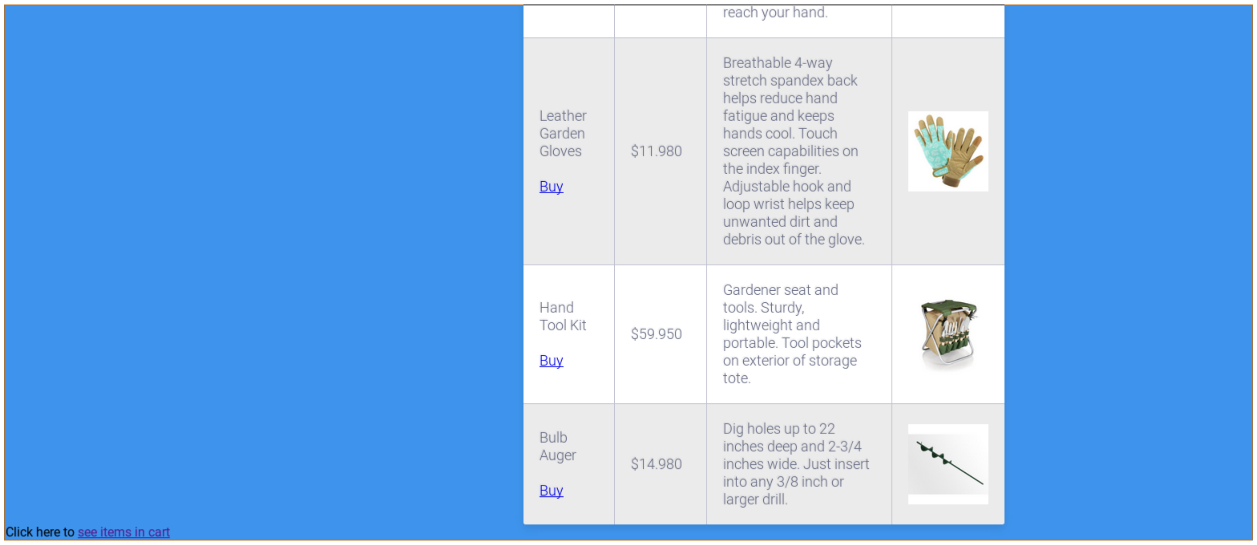
Figure 6: s5



YOUR SHOPPING CART CONTAINS 0 ITEMS.

Items	Price	Description	Image
Hedge Trimmer Buy	$149.000	Kobalt 80-volt cordless hedge trimmer provides the power you need with up to 70 minutes runtime on a fully charged 2.0 Ah battery. Complete your project faster with dual action laser cut blades at 3600 strokes per minute. Cut through thick shrubs with a 26-in blade and 3/4-in cut capacity.	
Root Assassin Shovel Buy	$50.000	48 In ROOT ASSASSIN shovel saw that is the original and best award winning shovel and saw Combo garden tool. Patented all purpose garden shovel and saw easily slices through roots. 16 beveled and serrated steel teeth on each side and cuts while digging both in and out.	
		A pruner with soft	

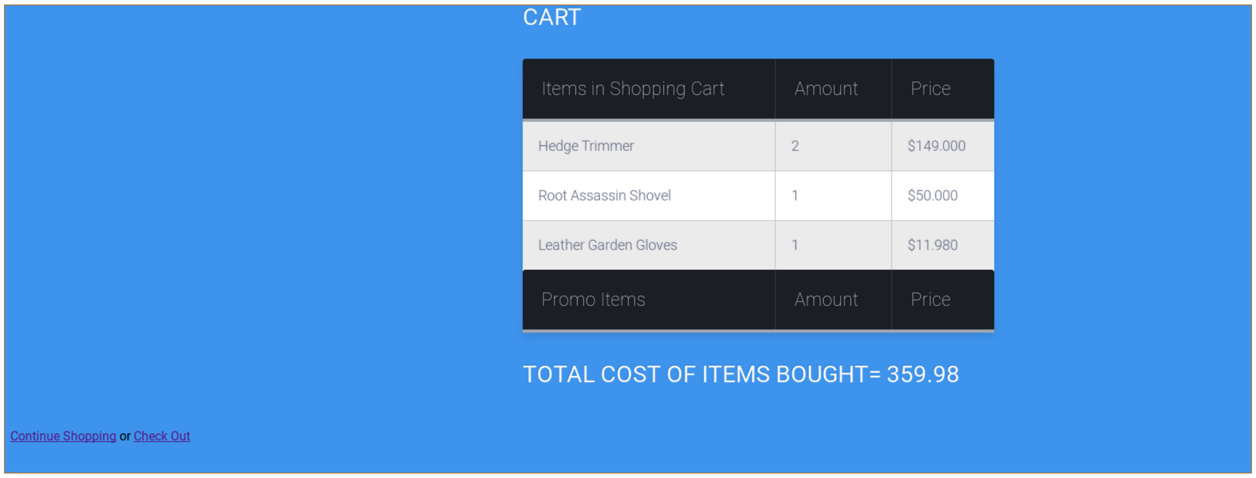
Figure 7: s6



		reach your hand.	
Leather Garden Gloves Buy	$11.980	Breathable 4-way stretch spandex back helps reduce hand fatigue and keeps hands cool. Touch screen capabilities on the index finger. Adjustable hook and loop wrist helps keep unwanted dirt and debris out of the glove.	
Hand Tool Kit Buy	$59.950	Gardener seat and tools. Sturdy, lightweight and portable. Tool pockets on exterior of storage tote.	
Bulb Auger Buy	$14.980	Dig holes up to 22 inches deep and 2-3/4 inches wide. Just insert into any 3/8 inch or larger drill.	

Click here to see items in cart

Figure 8: s7



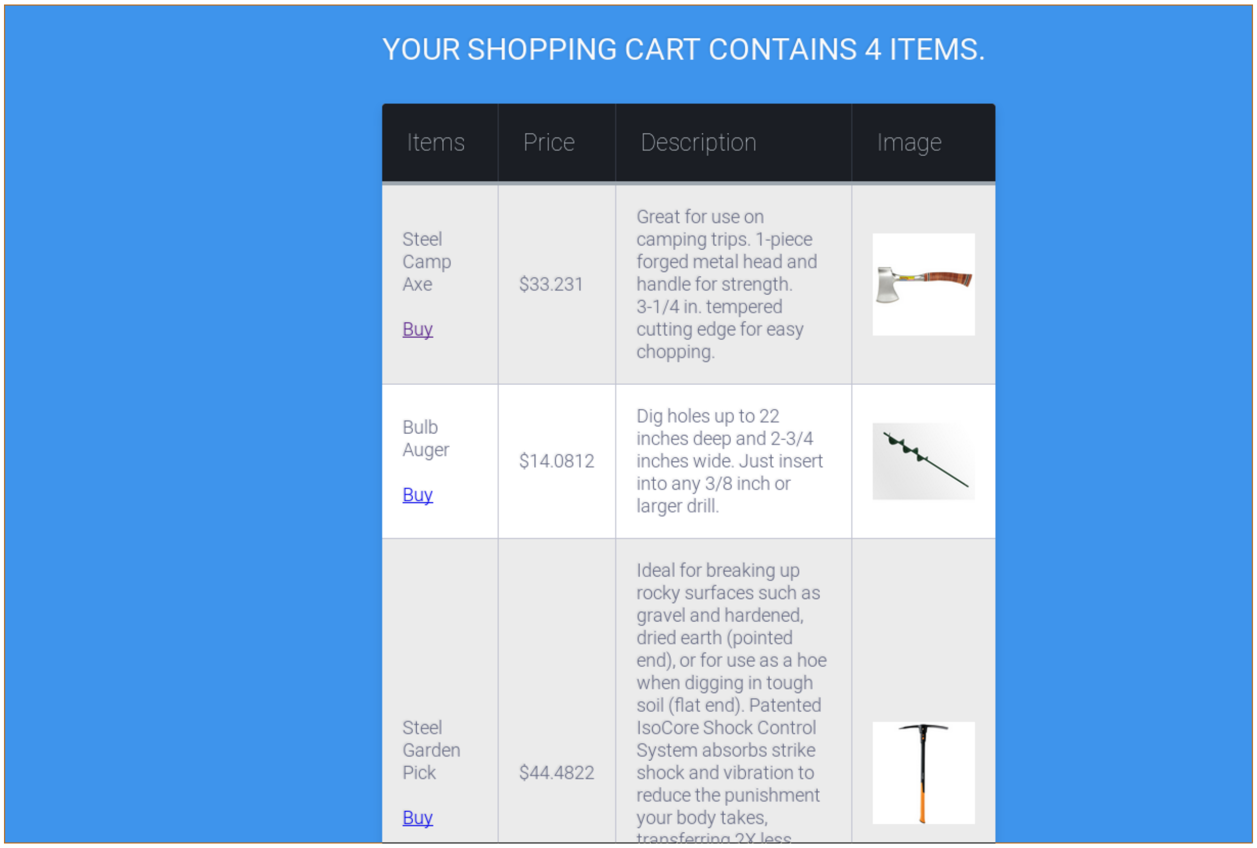
CART

Items in Shopping Cart	Amount	Price
Hedge Trimmer	2	$149.000
Root Assassin Shovel	1	$50.000
Leather Garden Gloves	1	$11.980
Promo Items	Amount	Price

TOTAL COST OF ITEMS BOUGHT= 359.98

Continue Shopping or Check Out

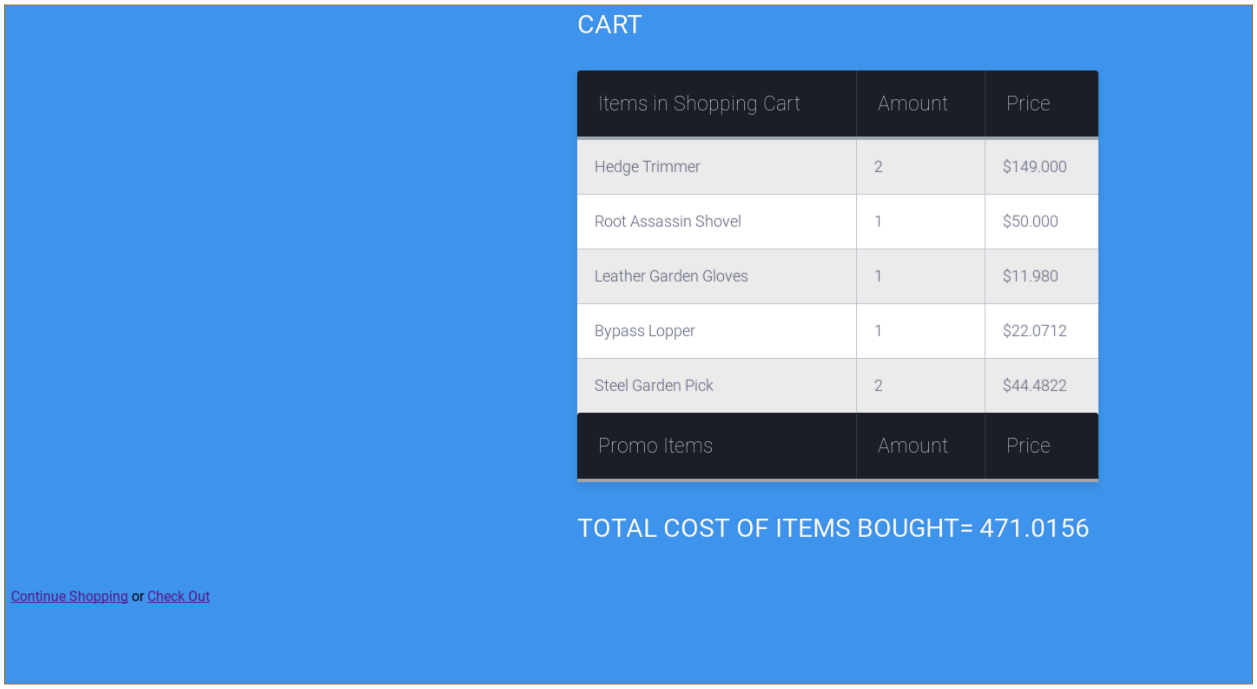
Figure 9: s8



YOUR SHOPPING CART CONTAINS 4 ITEMS.

Items	Price	Description	Image
Steel Camp Axe Buy	$33.231	Great for use on camping trips. 1-piece forged metal head and handle for strength. 3-1/4 in. tempered cutting edge for easy chopping.	
Bulb Auger Buy	$14.0812	Dig holes up to 22 inches deep and 2-3/4 inches wide. Just insert into any 3/8 inch or larger drill.	
Steel Garden Pick Buy	$44.4822	Ideal for breaking up rocky surfaces such as gravel and hardened, dried earth (pointed end), or for use as a hoe when digging in tough soil (flat end). Patented IsoCore Shock Control System absorbs strike shock and vibration to reduce the punishment your body takes, transferring 2X less	

Figure 10: s9



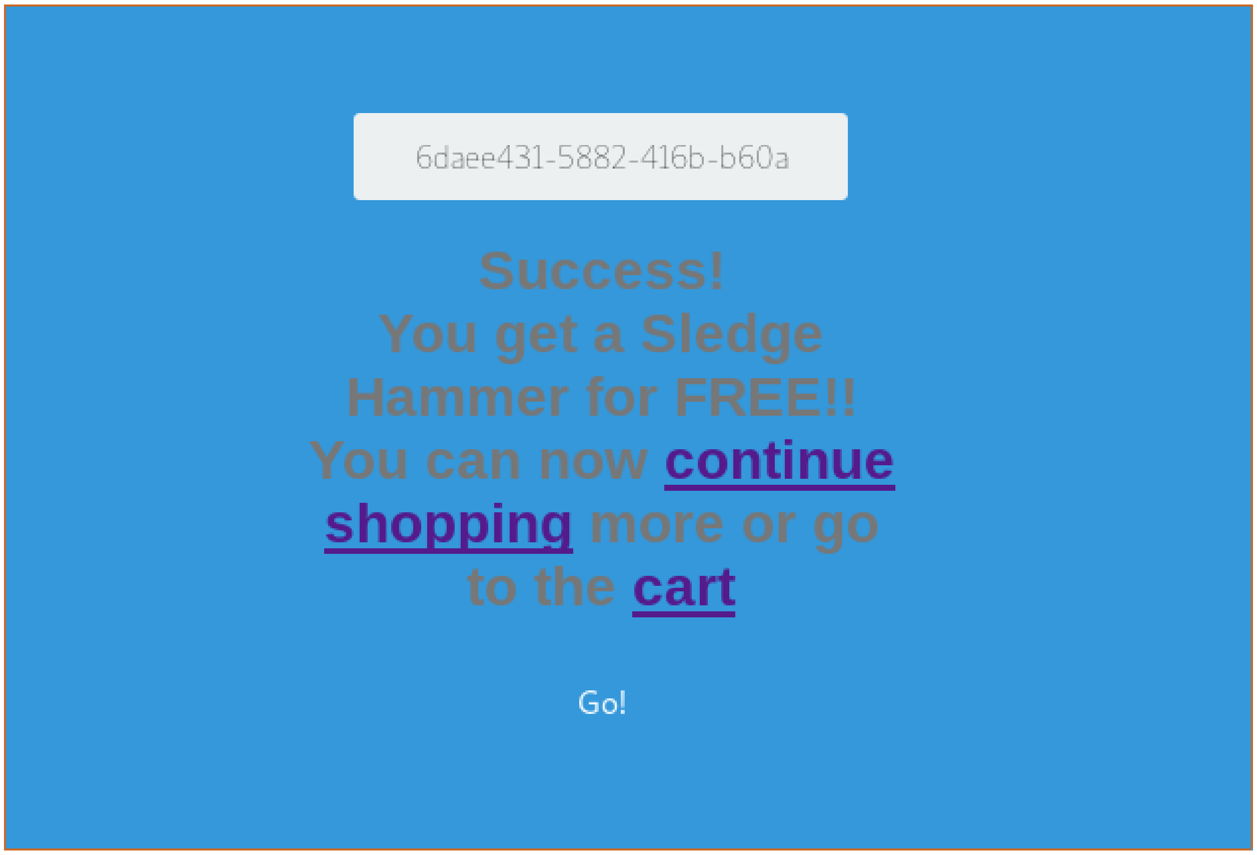
CART

Items in Shopping Cart	Amount	Price
Hedge Trimmer	2	$149.000
Root Assassin Shovel	1	$50.000
Leather Garden Gloves	1	$11.980
Bypass Lopper	1	$22.0712
Steel Garden Pick	2	$44.4822
Promo Items	**Amount**	**Price**

TOTAL COST OF ITEMS BOUGHT= 471.0156

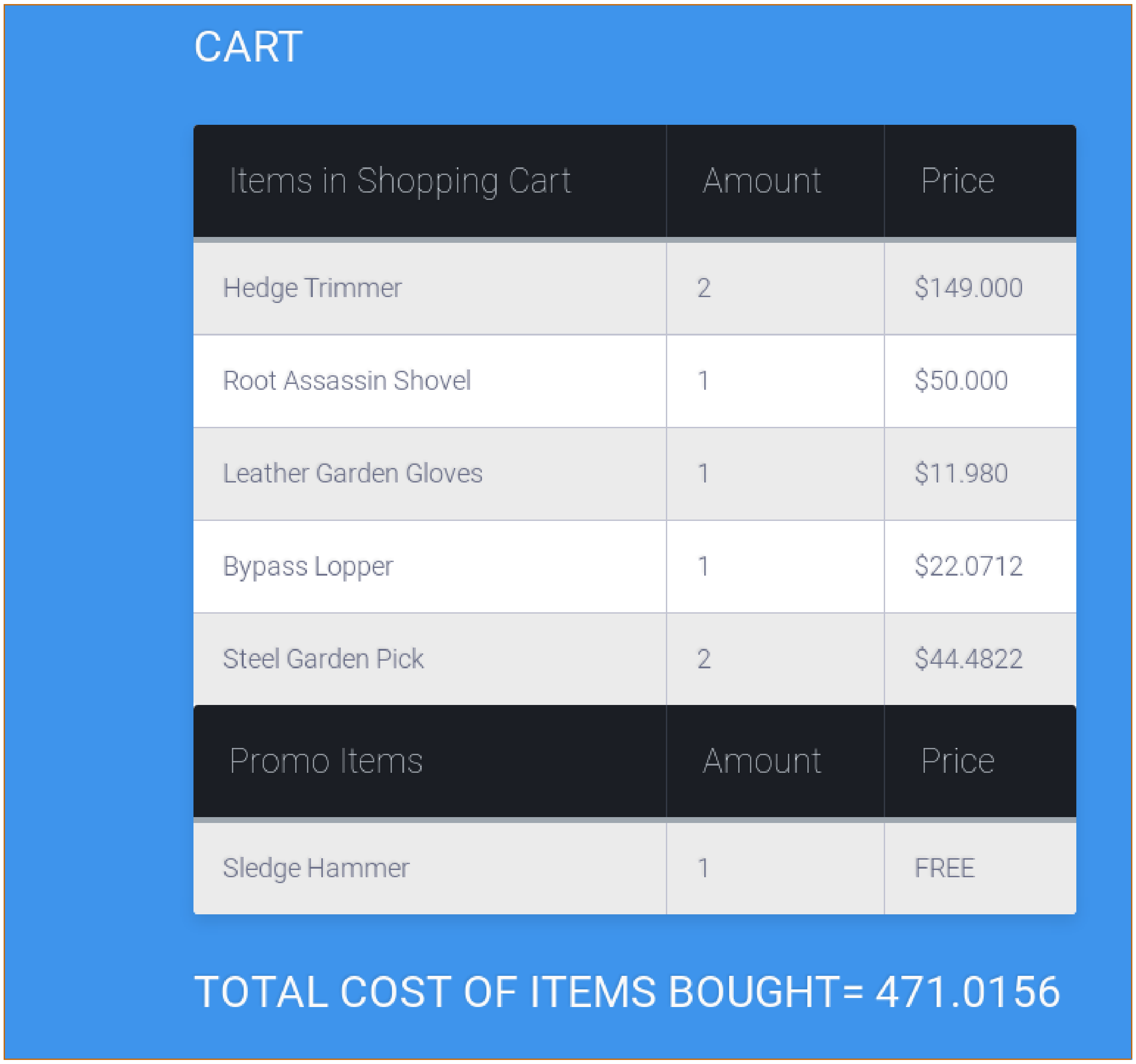
Continue Shopping or Check Out

Figure 11: s10


6daee431-5882-416b-b60a

Success!
You get a Sledge Hammer for FREE!!
You can now continue shopping more or go to the cart

Figure 12: s12



CART

Items in Shopping Cart	Amount	Price
Hedge Trimmer	2	$149.000
Root Assassin Shovel	1	$50.000
Leather Garden Gloves	1	$11.980
Bypass Lopper	1	$22.0712
Steel Garden Pick	2	$44.4822

Promo Items	Amount	Price
Sledge Hammer	1	FREE

TOTAL COST OF ITEMS BOUGHT= 471.0156

Figure 13: s13

item! Of course, we cannot have more of the same free item, so if we enter the same code many times, we sill only have one free time!