Technical Manual

Website For Helping People in a Disaster

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1. General Information

1.1 System Overview

An online platform for the people affected by a disaster. In order to protect a particular area from disaster, the recovery planners must identify the vulnerabilities caused in a particular area and provide appropriate services. Taking into consideration the damages caused by a disaster, we have developed a system that describes the application of the Assignment Problem in a form of a website which helps the people affected by a disaster. This website provides the affected people the capability to seek help when a disaster occurs. We have incorporated various web technologies like HTML and C# for developing our web application.

- A website developed using the ASP.NET web development model.
- The Model-View-Controller (MVC) framework for developing the web application.
- Web application is developed by implementing the Assignment Problem which uses the Hungarian method.
- We incorporated the Distance Matrix API for computing the travel distance and time between various locations for allocation resources appropriately.
- MySQL database for storing user data.

1.2 Acronyms and Abbreviations

- MVC: Model-View-Controller
- API: Application Programming Interface
- COA: Combinatorial Optimization Algorithm

1.3 The Assignment Problem

Web application project that we have developed implements the assignment problem. This assignment problem makes use of the Hungarian algorithm for resource allocation.

The Hungarian algorithm is considered as a combinatorial optimization algorithm which is used to solve the assignment problem. Combinatorial optimization algorithm finds the optimal object from a finite set of objects. The Hungarian algorithm used for the assignment problem could be better explained with a Matrix. Hungarian method basically solves the assignment problem in polynomial time.

One of the important category of the transportation problem is termed as the assignment problem. We have incorporated the use of the assignment problem for finding the minimum weight and the maximum matching for allocating the resources to the people.

The assignment problem is also termed as the linear assignment problem. It is generally defined as follows:
Given two sets of equal size, A and T, together with a weight function C: A * T -> R.
Find a bijection f: A -> T such that the following cost function is minimized:

$$\sum_{a \in A} C(a, f(a))$$

Since the cost function to be optimized and the constraints contain only the linear terms, the problem is considered as a linear problem.

1.4 Distance Matrix API

The Distance Matrix API is one of the important services that is used for computing the travel distance. For our web application project, we have incorporated the Distance Matrix API in our code in order to calculate the time and distance between various sources and destinations. The use of the Distance Matrix API helped us to allocate resources appropriately to the people affected by a disaster.

Information based on the recommended route between the source and the destination is returned by the Distance Matrix API. The detailed route information is basically not returned by this service.

Distance Matrix Request

The Distance Matrix API basically takes the following form:
https://maps.googleapis.com/maps/api/distancematrix/outputFormat?parameters
where the values for the output format could be JSON or XML.

The use of HTTPS is recommended as the security of the user data is important. The security plays an important role when we are dealing with the user data such as the user's location.

The Distance Matrix Request Parameters

Required parameters for using the Distance Matrix API is as follows:

- Origins
- Destinations
- Key

The Origins:

Origins are the initial location used for calculating the travel time and the travel distance. By making use of the pipe character (|) we can supply multiple locations.

We can supply locations in one of the following forms:

- Address
- Latitude / Longitude Co-ordinates
- Place ID

Alternatively, we can also use the Encoded Polyline Algorithm for supplying an encoded set of co-ordinates. An example of the encoded polylines is as follows:
origins=enc:gfo}EtohhU:

Basically, they should be prefixed with enc: and followed by a colon.

The Destinations:

Destinations are basically one or more locations that can be used for allocating the resources. As for the origins, we also need to calculate the time and distance for the destinations.

The Key:
The API key for the web application is basically termed as the Key. The key is basically used for identifying and managing the resources.
The optional parameters for the Distance Matrix API are as follows:

- Mode
- Language
- Region

The Mode:
The mode of the transport to use for calculating the distance is specified by the Mode parameter. Various valid modes are required to be mentioned in the application for using the mode parameter.

The Language:

Language parameter specifies in which language the output should be returned to the user. If the language is not specified, the API uses the default language. The default language is generally specified in the Accept-Language header.

The Region:

Region code is basically specified as a ccTLD (country code Top-Level Domain). It is basically a two character code.

2. System Summary

2.1 System Configuration

A configuration system is particularly used by the ASP.NET applications which enables the developers to define the configuration settings. The configuration settings are basically defined for a web server, for an individual application or for a website. The XML files are used for storing the ASP.NET configuration settings. Microsoft enables the users to configure features which include the following:

- Authentication Modes
- Compiler Options
- Page Caching
- Custom Errors
- Debug and Trace Options

The home screen of the web application is composed of various navigation tabs. The navigation tabs provide links to various web pages such as the Reporting Page, About Page, Contact Us Page and the Login and Sign-Up Page. Users can report an incident and provide its description using the Reporting Page.

2.2 Implementing MVC in ASP.NET

The ASP.NET is basically designed for developing dynamic web applications. It is an open-source, server-side web application framework developed by Microsoft. The web applications can be created various ASP.NET frameworks such as ASP.NET Web Forms, ASP.NET Web Pages and the ASP.NET MVC.

Various ASP.NET frameworks are appropriate for developing different types of applications. For example, ASP.NET Web Forms are particularly used where the developers use declarative and control-based programming.

Using the ASP.NET Web Pages allows the developers to create the HTML pages. Once the HTML pages are created, the developers can add server-based code to the different pages. This dynamically enables to control how the markup is rendered.

The Model-View-Controller (MVC) is particularly designed to be extensible which enables the developers to customize the framework as per their application. The MVC pattern makes use of the Front Controller pattern which basically processes the web application requests.

The Model-View-Controller (MVC) pattern is basically composed of three main components:

- The Model
- The View
- The Controller

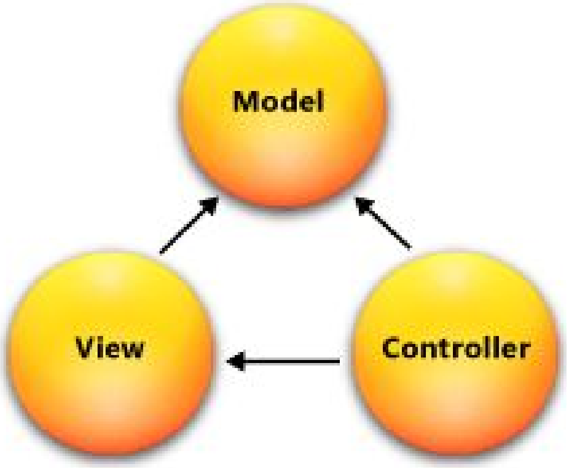


Figure 1: The Model-View-Controller (MVC)

Implementing the logic for the web application is basically the part of the Model objects. The model states are retrieved and stored in the database system by the Model component.

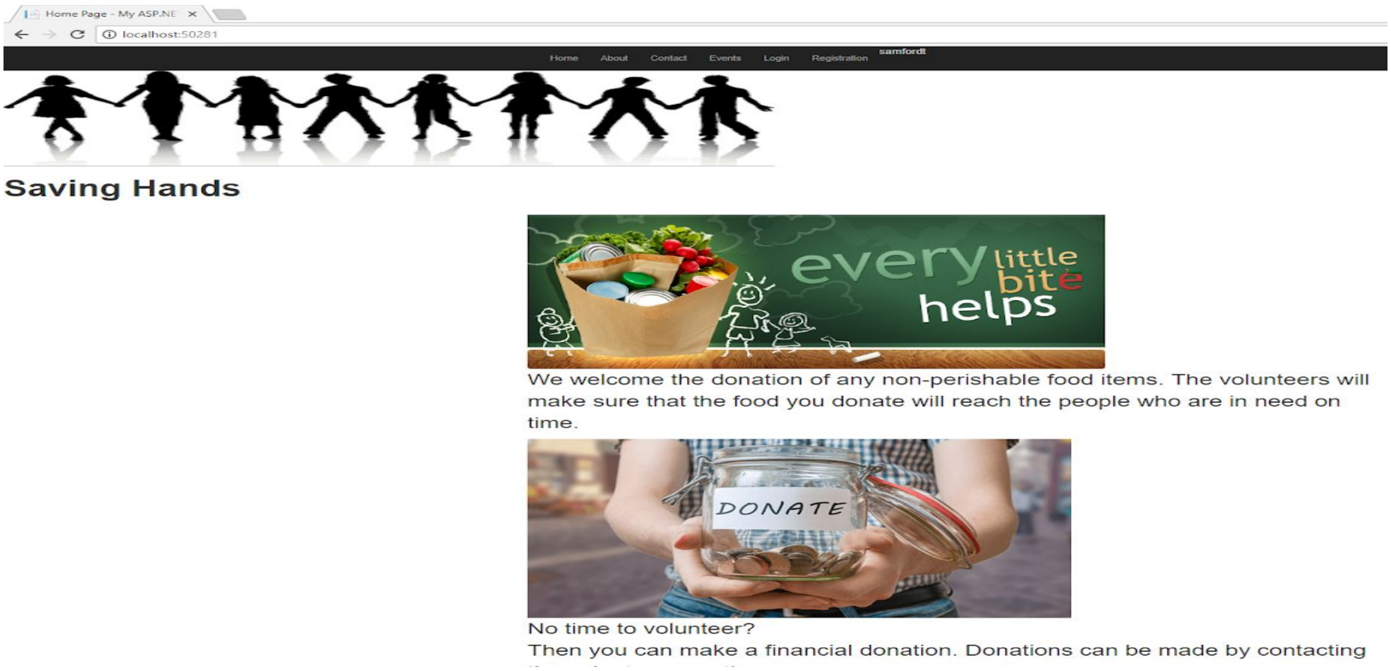
Displaying the user interface of the web application is the primary role of the View component. This user interface is basically created by making use of the model component.

Handling the entire web application together is done by the Controller component. They basically handle the user interaction and work with the model. The controller also selects the view for rendering the user interface display.

3. Using The System (Online)

3.1 User Interface

Home Page:



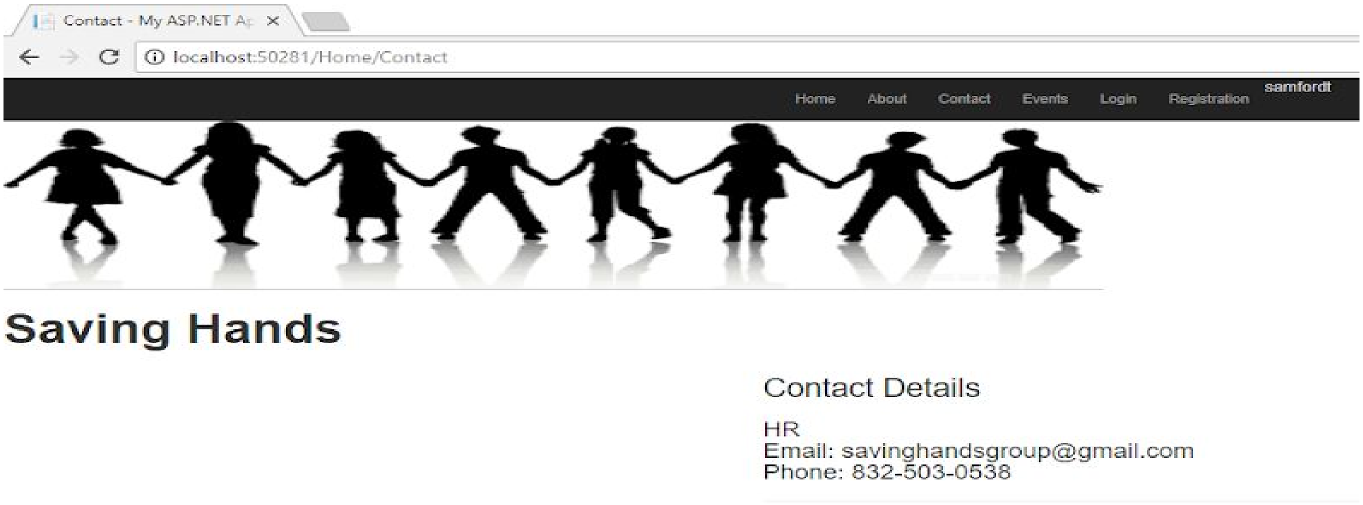
Saving Hands

We welcome the donation of any non-perishable food items. The volunteers will make sure that the food you donate will reach the people who are in need on time.

No time to volunteer?

Then you can make a financial donation. Donations can be made by contacting

Contact Us Page:

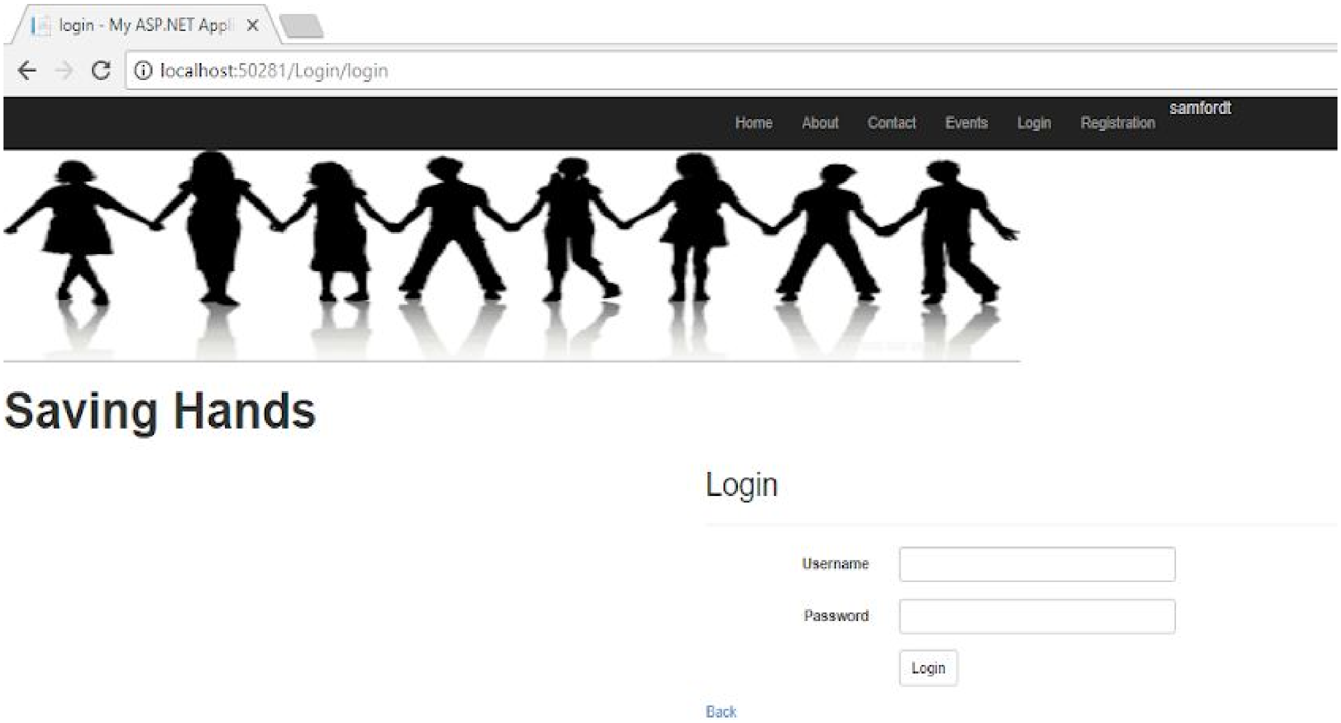


Saving Hands

Contact Details

HR
Email: savinghandsgroup@gmail.com
Phone: 832-503-0538

Login Page:



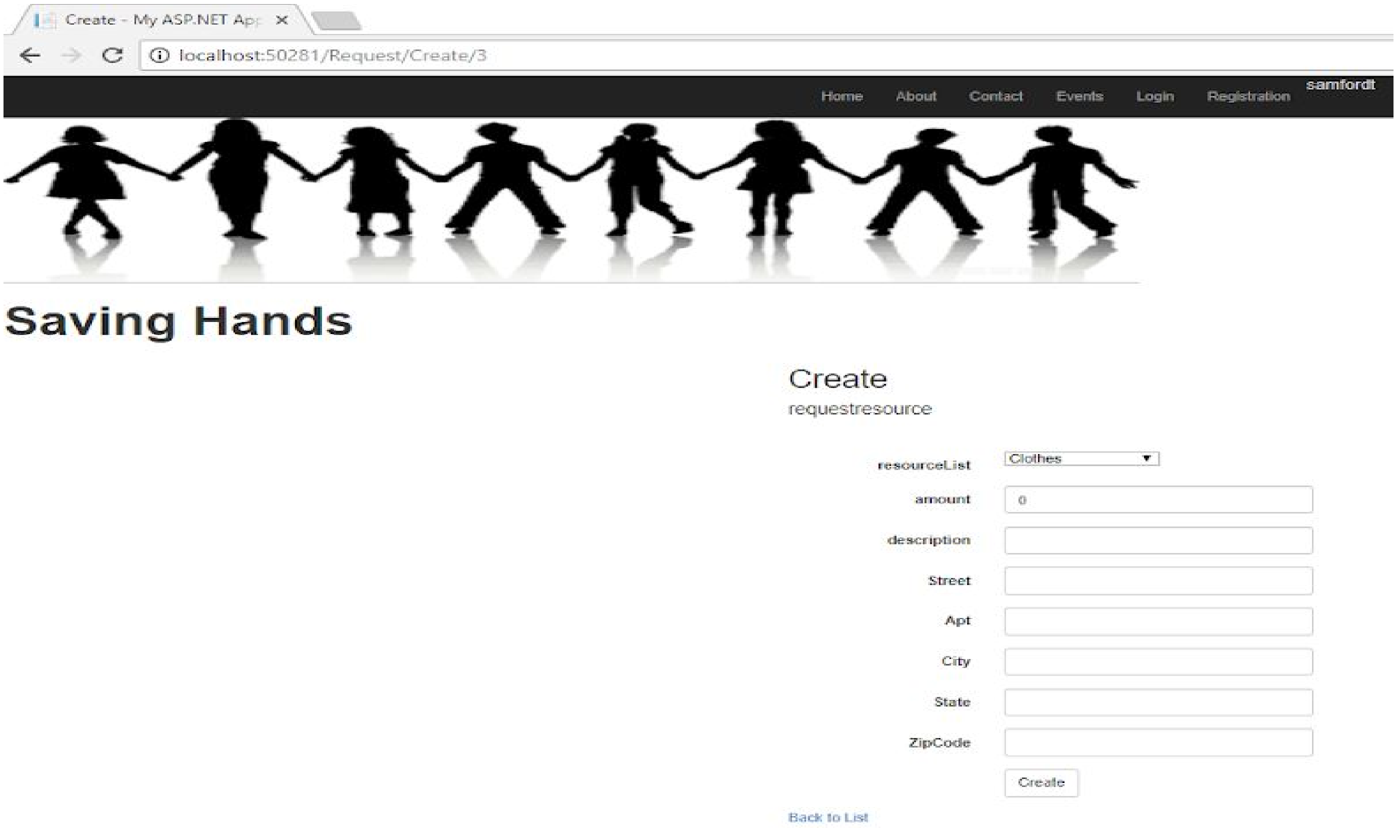
Saving Hands

Login

Username

Password

Request Page:



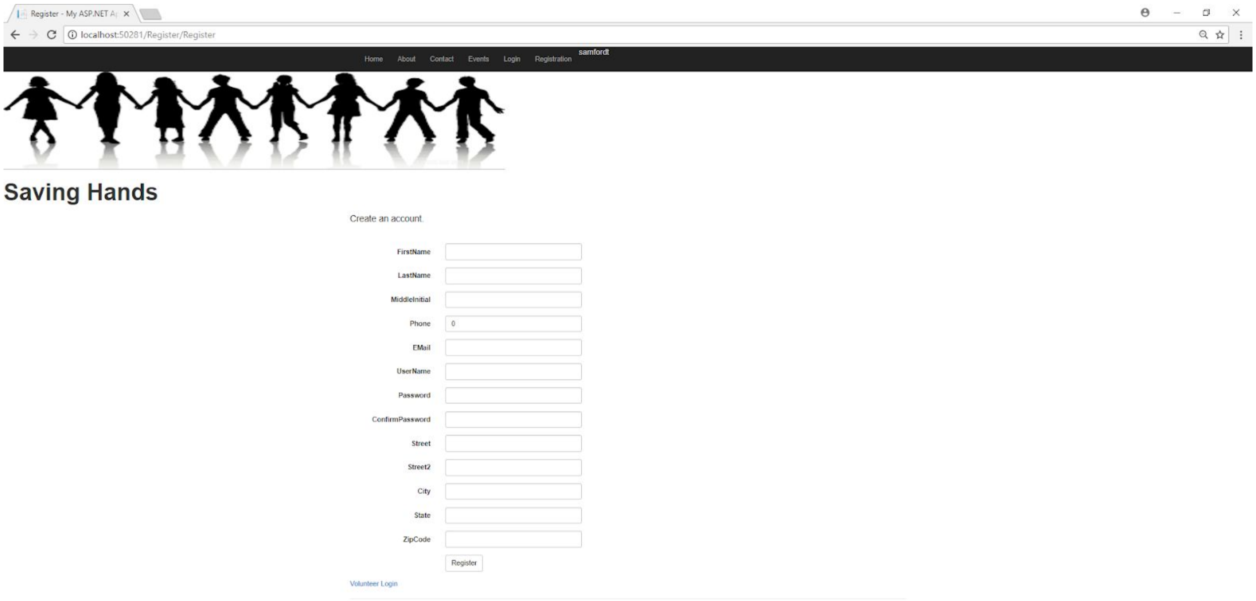
Saving Hands

Create

requestresource

resourceList	Clothes ▾
amount	0
description	
Street	
Apt	
City	
State	
ZipCode	

Register Page:

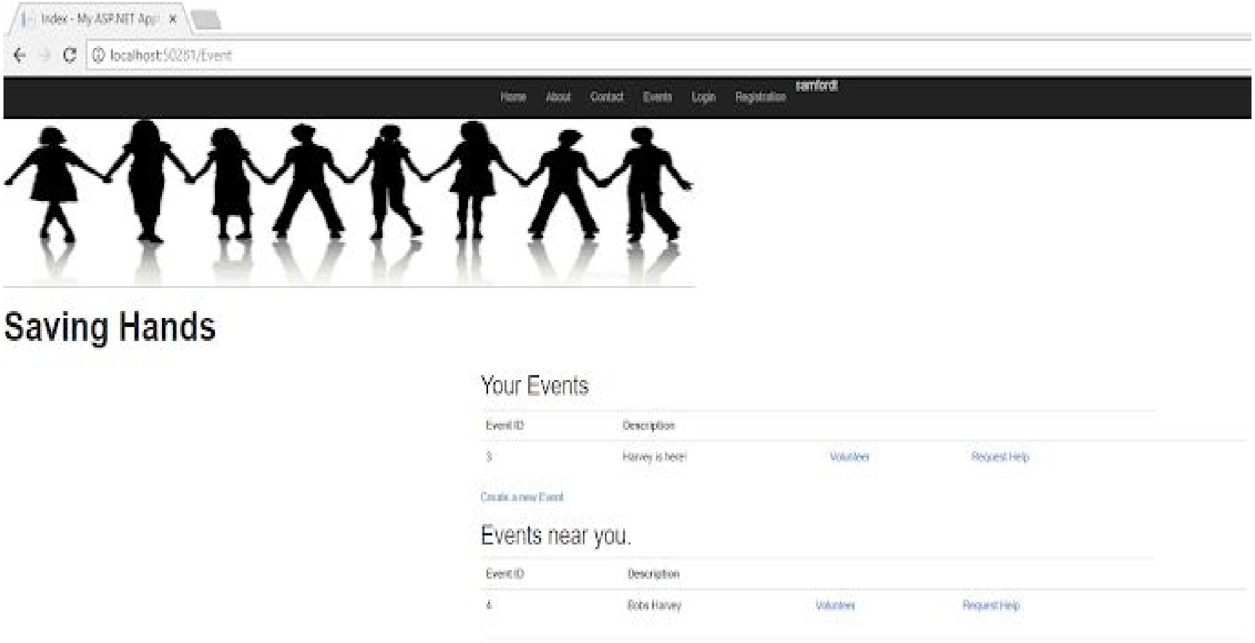


Saving Hands

Create an account.

FirstName	
LastName	
MiddleInitial	
Phone	0
EMail	
UserName	
Password	
ConfirmPassword	
Street	
Street2	
City	
State	
ZipCode	

Events Page:



Saving Hands

Your Events

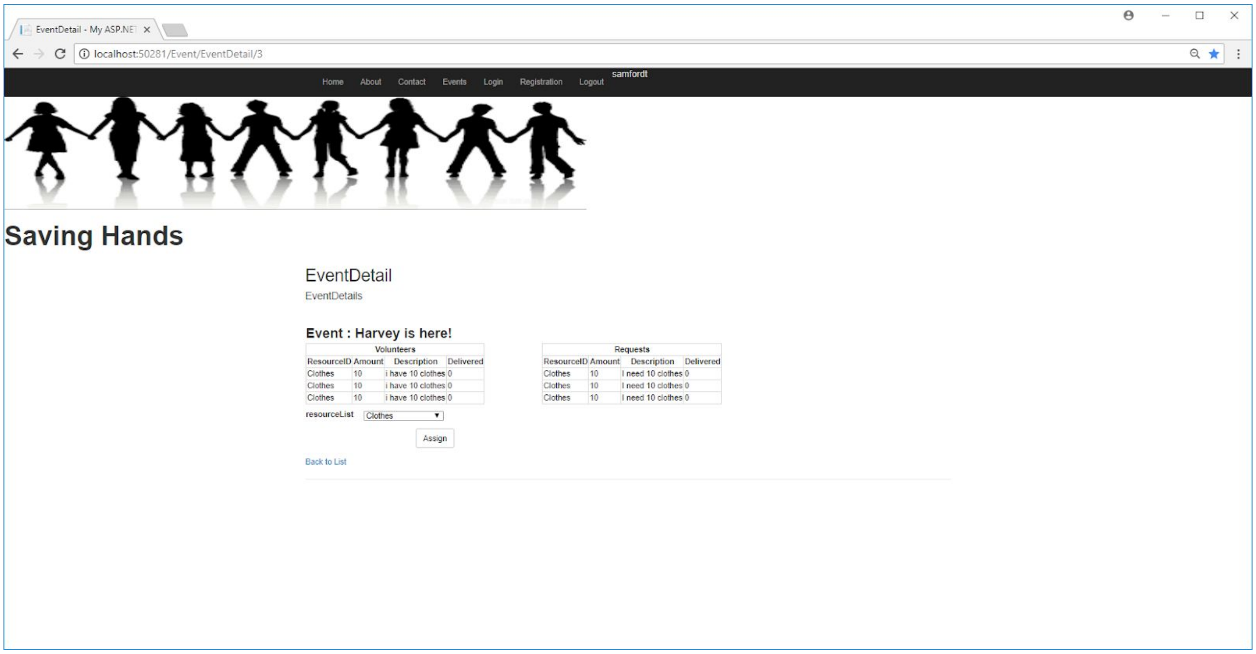
Event ID	Description		
3	Harvey is here!	Volunteer	Request Help

Create a new Event

Events near you.

Event ID	Description		
4	Bobs Harvey	Volunteer	Request Help

Details Page:



Saving Hands

EventDetail

EventDetails

Event : Harvey is here!

Volunteers			
ResourceID	Amount	Description	Delivered
Clothes	10	i have 10 clothes	0
Clothes	10	i have 10 clothes	0
Clothes	10	i have 10 clothes	0

Requests			
ResourceID	Amount	Description	Delivered
Clothes	10	I need 10 clothes	0
Clothes	10	I need 10 clothes	0
Clothes	10	I need 10 clothes	0

resourceList Clothes ▾

Assign

Back to List

4. Project References:

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