The CHC Website

Software Requirement Specification

Team I

CSE442

Team Member Names

Chittora, Atul
Ciacia, John Joseph Jr
Favero, Cris Michael
Matuskiewicz, Philip J
Muraco, Andrew Joseph
Tillotson, Daniel R

Table of Contents

Assumptions/Limitation/Constraints

The website design below is broken up into the following assumptions, limitations and constraints. They fall under the categories of:

- **Server / Hardware Constraints / Assumptions of what will be available**

We assume that a minimum of 30 minutes of runtime will be achieved in a complete power failure. This should be handled by an uninterruptable power supply. The hardware should begin performing a proper shutdown within 5 minutes of any power failure.

The server will require that a minimum connection speed of 10Mbps in both the downstream and upstream directions. It is required that there are dual network interface cards installed in the server to prevent network failures on the machine itself. A public non-firewalled IP address must be provided by the ISP. The server will maintain a secure firewall for security purposes.

The server hardware should include at least the minimum server processor speed that is recommended by the operating system. We recommend at least 1GB of RAM be present in the server. The minimum hard disk speed in the server is set to 5400 rpm. It must be at least 80GB in size. We also expect dual disks to be attached to a RAID 0 controller which will ensure fault tolerance in the data and optimal uptime. The hardware should be kept in a cool environment that is maintained, cool is defined as 55° – 70° Fahrenheit.

- **Software Constraints / Assumptions on what will be provided**

The server should be equipped with a Linux operating system distribution. This will provide maximum uptime and excellent reliability. We recommend that CentOS / Redhat be the distribution chosen.

The server should have Apache 2 or a greater version installed. Apache will support SSL connections by default which will enable encryption. In addition, Apache should have PHP 5.2.9 or greater compiled into it. PHP will communicate with a MySQL server of version 5 or greater.

The server will need a control panel such as CPanel to handle FTP logins (File Transfer Protocol). It will also handle incremental automated backups of the site itself. Additional features of the control panel may include statistics generation and email account administration. Although these are nice features, they are not necessarily required.

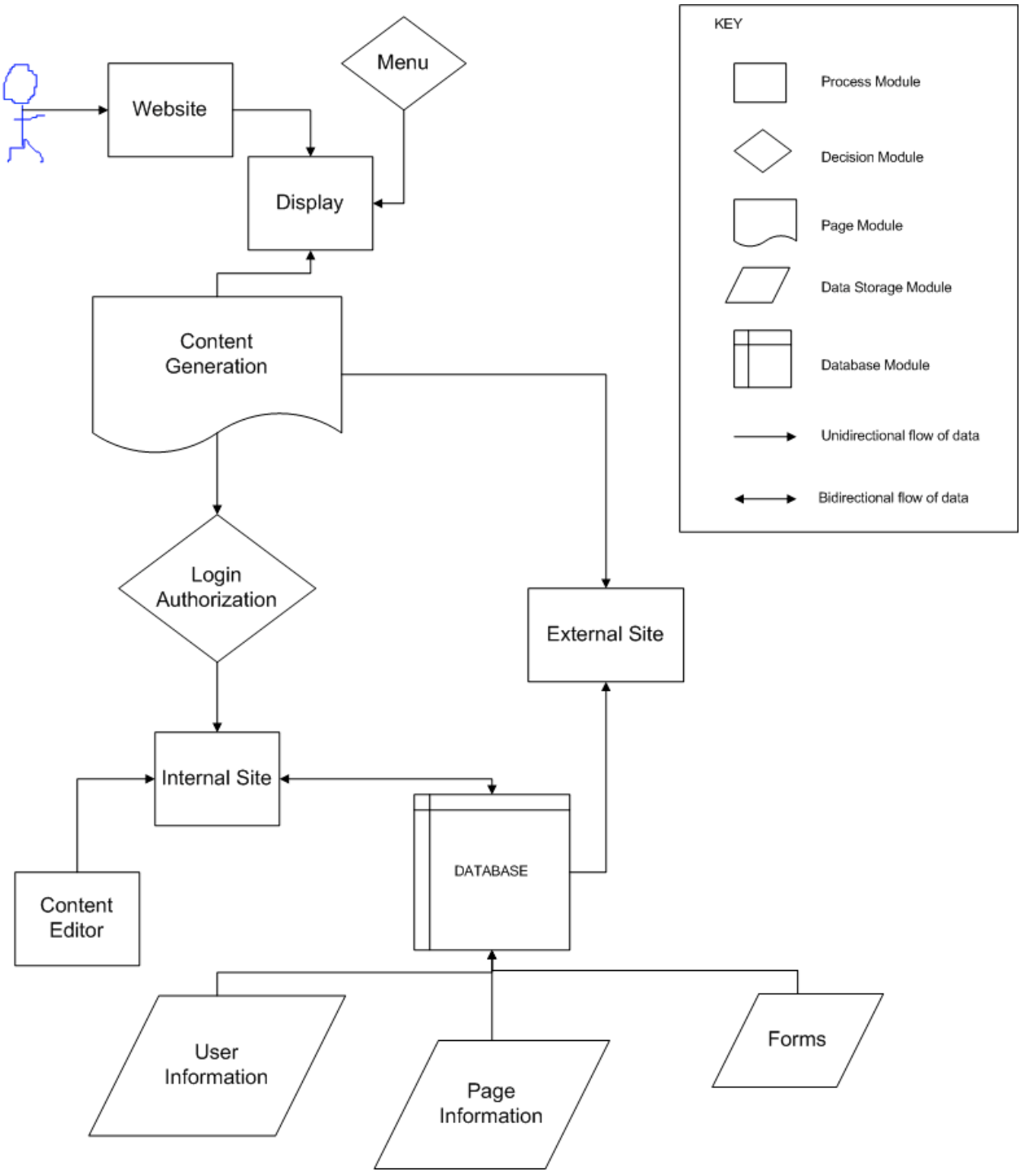
- **Assumptions/Expectations of the User**

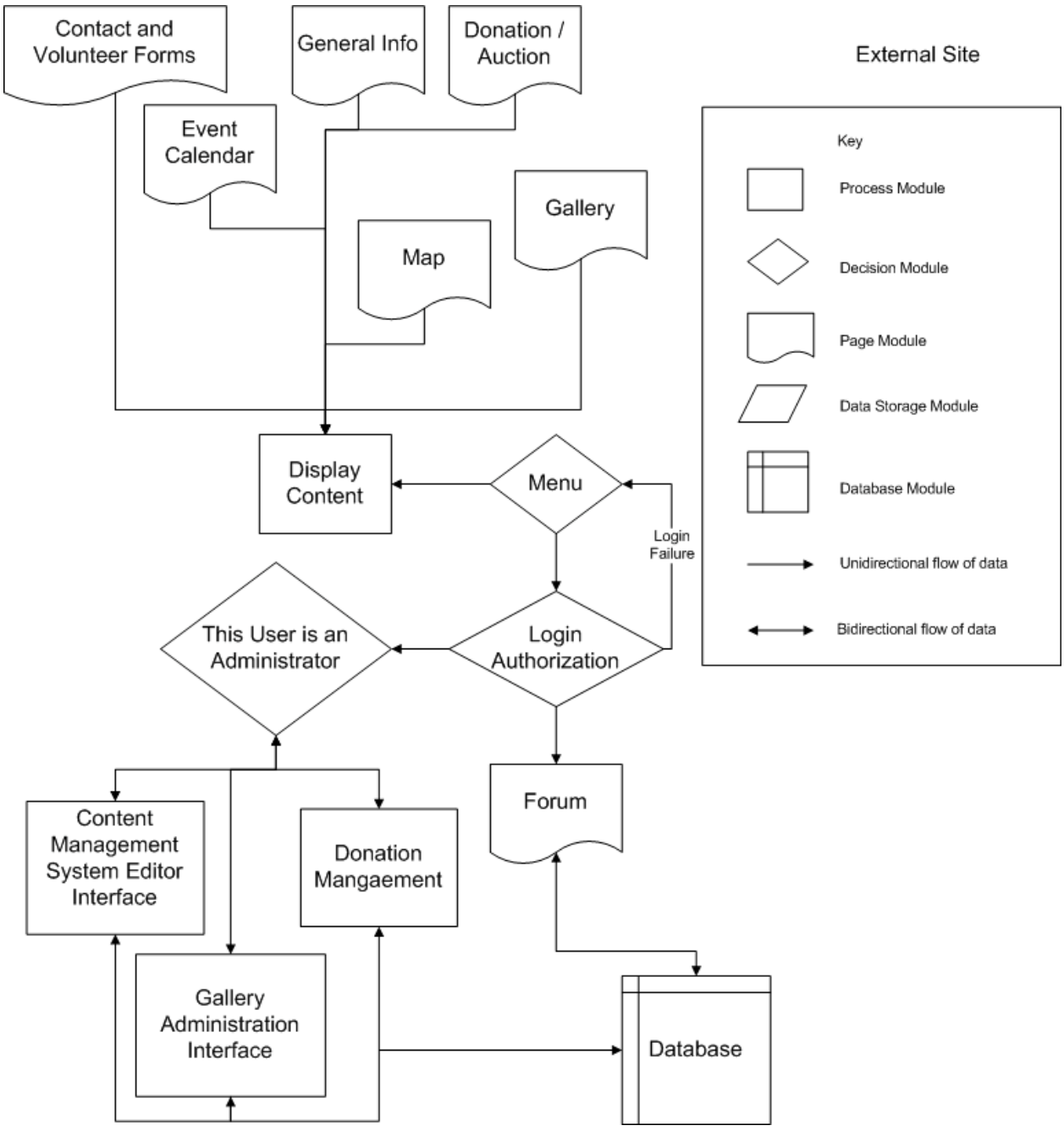
We assume that the authorized user's computer will have a broadband connection to the internet. We also assume that this computer will have at least one of the following browsers: Microsoft Internet Explorer 7, Mozilla Firefox 3, Google Chrome, or Safari 3 (or later versions). The site administrator using this computer will be responsible for using one of these supported browsers to update content on the website as well as relaying bugs and concerns to the development team via the change request form attached.

- **Limitations**

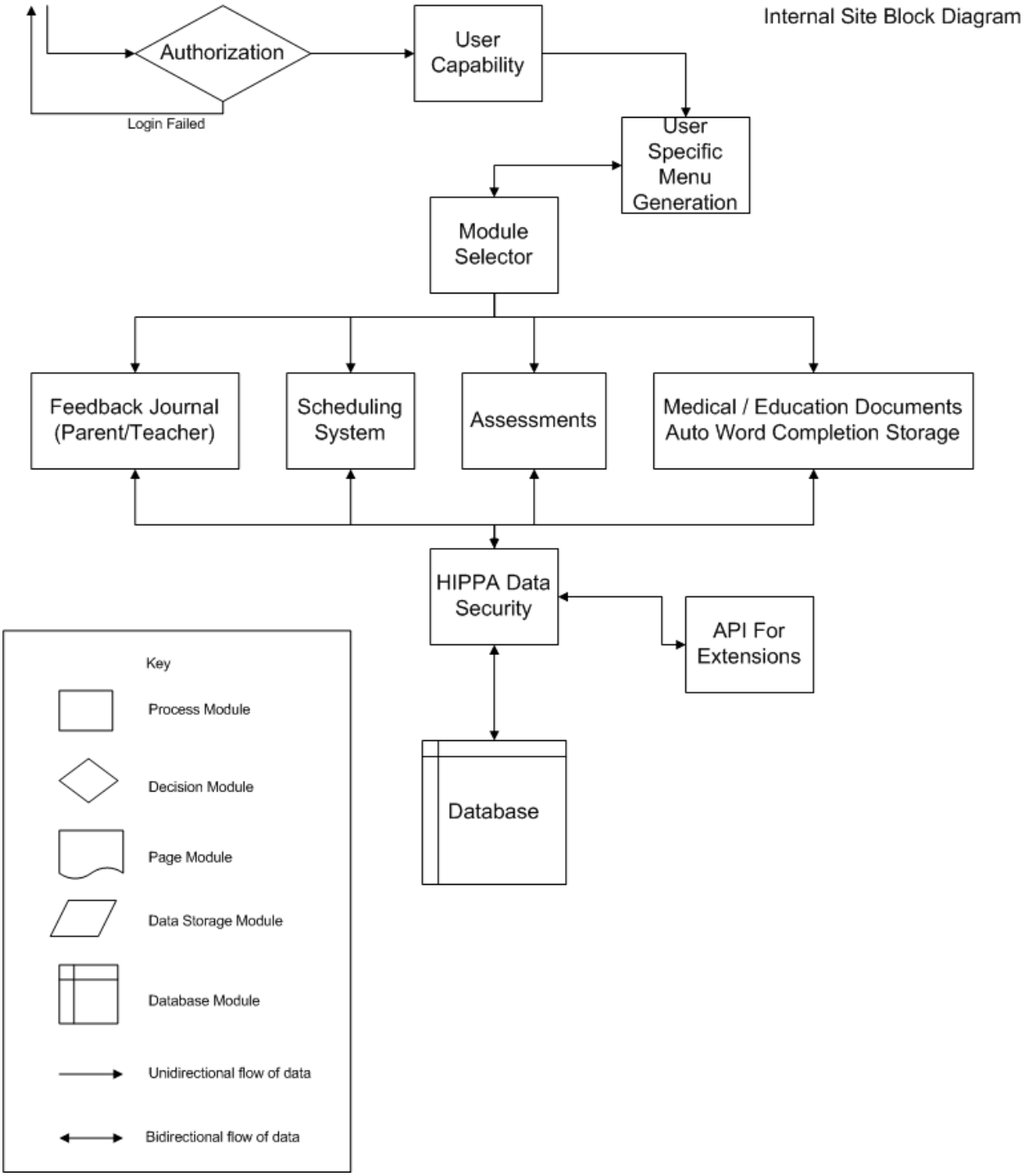
Let it be known that the provided resources may limit the amount of concurrent users on the CHC website at any given time. The upstream connection will limit concurrent surfing of the website, and it is advised that a faster connection be provided for the server. The server hardware itself, such as the hard disk drive, will limit how much data can be stored on the website and how fast data can be displayed on the website.

Block Diagrams




Contact and Volunteer Forms
General Info
Donation / Auction
Event Calendar
Gallery
Map
Display Content
Menu
Login Failure
This User is an Administrator
Login Authorization
Forum
Content Management System Editor Interface
Donation Mangaement
Gallery Administration Interface
Database
External Site
Key
Process Module
Decision Module
Page Module
Data Storage Module
Database Module
Unidirectional flow of data
Bidirectional flow of data

Internal Site Block Diagram



Major Modules Narrative

Definitions

- Non-authenticated Users / Guests - Users who have not logged in to a system
- Authenticated Users - Users who have logged into a system. These users are created by the CHC staff or administrators.
- Parents - Authenticated users with permission to access the private sections.
- Users - Either authenticated or non-authenticated users
- Staff Users - Users with special permissions to manage certain portions of the site. This user group has all the permissions of *users* as well.
- Administrators - Users with permissions to manage every portion of the site. This user group has all the permissions of *staff users* as well.
- System - The entire website and all components of it excluding the users

The CHC website system can be split up into four major modules that contain sub modules. These categories are the controller, the view, the information storage, and the administration area. Below we cover these modules in greater depth.

The Controller Module

Website

The entire system begins at this point. This is the system's input from and output to the user. All information to and from the user must pass through this module.

Display

After a user has invoked the website component, the display module will be invoked. When the display module is invoked, it will ask the menu module to return a list of options for the user to choose from. The user should then make a decision of what they would like to do in terms of website navigation. Based on the user's decision, the menu module will tell the display module what it should ask for from the content generation module. The display module will then request that the content generation module provide it the necessary information to complete the user's request.

Depending on whether or not the user has authenticated (logged in), there are two possible outcomes of what the menu will allow to be chosen and what the display will return to the user.

Case 1 – The user is not authenticated:

Non-authenticated users will have access to all the public modules and information. This includes access to the contact information, the ability to donate money through PayPal or bid on items that are being auctioned, and access to the photo gallery module.

Case 2 – The user is authenticated:

Authenticated Users will have access to all the information and modules the non-authenticated users have access to as well as the internal site. All private information needs to adhere to HIPPA guidelines.

Menu

The normal users will be able to see a menu under the top of the website. Users will be able to navigate the website using different links in the menu provided. In the case of authenticated users (e.g. staff or administrators), this menu will provide the means through hidden links to modify the website and / or the information of students / other users.

Internal Site

The internal site will be made up four primarily modules which are responsible for the control of the other extensible plug-in modules. These primary modules serve as a method for allowing new features to be added and old features to be removed with very little effort. These key pieces are the HIPPA data security, module selector, authorization/capabilities, and API for extensions.

The HIPPA security module is responsible for taking all secure information pertaining to the patient and encrypting it so that it is not stored in the database as a clear text. This module will also be responsible for any further HIPPA required security features as may be determined in the future.

The module selector is responsible for handling all the main queries to the internal site. It determines which plug-in module is responsible for processing the data. Additionally this module is responsible for reporting errors if the information is trying to be sent to a plug-in that is not available (or not accessible by that user). This section also is responsible for reporting the user's abilities for each plug-in to the menu system.

The authorization and user capabilities modules are two separate modules that both work in conjunction with each other. The reason this is not one module is because it was determined early on that to support forums using the same username and passwords we would need to separate these slightly so that whichever forum system is chosen to be used can operate independently of the abilities of the present module. The key role of this set is that it will control who gets to see specific information. This maintains the child's information in a secure record that can only be viewed by authorized personnel. In addition it will also help the menu generation system to present links specific to what that user is able to do.

Finally the API for extensions will be a set of simple programmable interface calls that can be utilized for data acquisition from sources other than the website itself, such as but not limited to Badge tracking, computer usage and other pre-existing tools.

Some of the planned plug-ins for the internal site includes several key features which have been identified as the most advantageous for initially helping increase productivity and communication.

The Feedback Journal is meant to augment (or possibly replace) the current paper notebook journals that are kept with the students now so that they can be checked and updated at anytime rather than just when the student arrives home or at the center.

The Scheduling system is essentially a calendaring system that will help when trying to determine where people, both students and teachers, are likely to be or have been. This way if a parent is curious what activities their child is currently involved in they can see. Additionally, if one of the staff is needed, it will be easy to look up there location. In the future this could be tied together with the badge tracking system to provide verification of the data.

The Assessments plug-in is a simple tool for keeping track of progress that is being made. Much like a teacher of a non handicapped student would track grades; this system could be used for tracking progress of individual activities, and ranging anywhere that such a metric would be useful.

The last of the currently anticipated modules is a system for auto completing medical and educational documents using data that is acquired through the website. This system would be able to be programmed with standardized forms so that the information can be quickly dispensed into them allowing for more free time to handle other administration tasks. This will significantly decrease time spent on filling out forms and documents that require repetitive information which is readily available to the computer.

External Site

The External Site is driven by a menu and login authorization decision module, which together determine who the user is, and what they can access. A sub element of the authorization module is the component that determines if a user is an administrator, and thus has access to additional processes. The Login Authorization module will be the main means of protecting the site against unauthorized changes. The Menu module provides the user with the proper actions and areas for their access level. Globally, all pages will be processed by the Display Content process module, which will select the correct view to present to the user and embed the data from the database into the view before outputting it in the site template. This will ensure a consistent look and feel throughout the site along with keeping the sites' authorization and menu systems tightly coupled without regard to individual modules. Essentially, these modules will form the base framework for page request handling and page generation for the entire site.

The majority of data will be requested from the database, and a view will be processed to generate the page. The various Page Modules will be separated from the database object that they represent so that the view of the site can be adjusted easily without changing any other parts of the system. The Donation/Auction page module will use eBay as a database for Auctions and PayPal as a process module for donations to provide security for these sensitive transactions so that the CHC site will have limited liability with regards to fraud and abuse – eBay and PayPal both have advanced systems and APIs to deal with online transactions what will be used within this system.

The Map, Event, Gallery and Contact/Volunteer Form page modules will format the corresponding data from the database and provide basic navigational features within the page module itself. Basic navigation features include pagination by quantity, pagination by date and submission of the contact/volunteer form. Other navigational features may be added via the change request form provided.

Authorized users, including non-administration users have access to the Forum page module. The Forum page module will utilize phpBB as a prebuilt open source solution which provides industry standard features and flexibility to customize to the CHCs needs. The Forum module will reuse the login system and be modified so that phpBB does not maintain its' own user database.

Administration Level users will be granted access to management interfaces based on their authorization. The Login module coupled with the administrator determination module will control access to these Administration interfaces. The Content Management System Editor Interface serves as a portal to control the content in the database for use by other modules. The content of the home page, event calendar, map and Contact/Volunteer will be directly controllable by CHC administration. The free, open source editor tinyMCE will be integrated into the interface for this module to give CHC a variety of formatting. The Donation Management process module connects with both eBay and PayPal to manage donation sources and enable easy posting of items on eBay with a predetermined configuration as part of the CHC storefront. The Gallery Administration interface is specifically designed to allow the CHC to post images to the site gallery for visitors. These galleries need not overlap with events, but the gallery module will enable easy creation of post-event galleries.

Authentication / Administration Components

Login Authorization Module

The user will be authenticated after providing a username and a password to the system. This module validates the credentials provided by the user and will check them against secure password hashes stored in the database component of the website. After a successful login, access is granted to hidden material on the website based on the user's privileges. This module limits failed login attempt to five per day to ensure good security. Only the administrator will be able to reverse the locked account status invoked by this security mechanism.

The Template System

The template system is basically the content generation module in the block diagram. This module is responsible for getting a request by the display module and returning the necessary page information for display on the website. The content generation module is directly linked to

the external and internal sites which will do most of the work in getting the information together that will be displayed on the page. All this module has to do is take that information and put it on a neatly formatted page that the display can send to the website module (also known as the user).

The Database Module

The database module of the system contains all of the information of the system. This includes but is not limited to all information pertaining to users of the system, pages generated by the system, and anything else that is considered information. The storage requirements of the system can be broken into the following modules:

User Information Module

The user information module contains all the information pertaining to the users of the system. This includes (but isn't limited to) the user's schedule, history, full name, address, age, birthday, emergency contact information, and medical records. This information is stored in compliance with HIPPA, meaning this information is private. Only the administrator will have the power to access all information contained within this module due to the sensitivity of the data stored here. Authorized users such as staff will be able to view, append to, and modify a user's (child's) record provided they will be working with the child on that day. Parent users will be able to access their child's record to keep track of their child (e.g. scheduled activities, progress, etc).

Forms Module

Upon login, the administrator will have the ability to upload various forms on the website. This user will also have the access to review completed forms that are submitted online. The non privileged users of the system will be able to view these forms on the external portion of the website.

Forms that will be available online include but are not limited to:

1. Employment application forms - can be used to apply to open positions at the CHC
2. Complaint/feedback forms - can be used to file complaints or submit comments and/or suggestions about the CHC to the CHC
3. Volunteer Application forms - can be completed by those who are interested in volunteering their services to the CHC.

Page Information Module

This module contains all the information that is required to generate website pages. This information may include (but isn't limited to) the navigation structure of the system, the structure of a given page, and the location to all the images that may be displayed on a given page. The content generation module will heavily rely on this part of the database indirectly through the internal or external site module.

Configurability / Flexibility

Our system places modularity and expandability as one of the keystones for the development of this site. We support this idea via several different methodologies, each itself with a unique focus. More generally these aspects are promoted at two different stages development time and run time (the live site).

Looking first at how we achieve this during development time we see that first and foremost our site is split into its two distinct halves being the external public site, what anyone who visits the site can seed, and the internal site, which will be the business back end of the site. The only thing these two will share in common is the authorizations, which is needed for the forums and accessing administration functions. The second of these pieces that leads to expandability is that the design is based on a modular controller system. When new features are needed, a new module that responds to a simple, loosely coupled interface can be created and dropped into place. Third, the design of the site itself will be written using fully compliant XHTML/CSS template to allow for an ever changing design, should they desire a new style without the need to redo the all the background information. Lastly, the system will contain a API that will be accessible by other applications outside of the realm of the website itself, this could be used for helping tie in other data acquisition methods such as but not limited to badge tracking, computer usage, phone/SMS systems.

Looking separately at the run time side we will build in a very flexible menu/content system for allowing an administrator at the Center for Handicapped Children to add and remove content as they see fit. This will help prevent the site from becoming stale, while also saving them the time and money but not having to hire an individual who understands HTML for simple content changes such as changing dates of events or contact info. Also through administration section of the website different management tasks can be a attributed to several individuals, allowing for a focusing of work as they grow and change.

Risks

Our system will involve many risks that must be weighed thoroughly before implementing such a solution. Solutions to these risks are provided in some cases but may cost substantially more than the risks that are involved.

Our system relies on hardware which will inevitably fail at some point. The hardware that is involved includes the server, network connected to the server, and the power being provided to the server. Failures that will be mentioned below can be broken up into two types, hard failures and soft failures. A hard failure is a complete failure in terms of the hardware entirely died and is not revivable; it will affect all other components of the system. A soft failure is when the hardware or system is still running, but it is running at a reduced capacity, is showing signs of age, or is malfunctioning in some aspect that doesn't directly affect the rest of the system.

The outlook of the hardware risks here assume that the system should be warranted from defects by the manufacturer for a period of 5 years. The following risks are involved:

CPU – The central processor of the server is at a very low risk of failing because processors generally outlive the computer.

RAM – This is a low-medium risk. RAM does fail occasionally and bad RAM can be checked with memtest86 or similar utilities obtainable online or at your local computer repair store. RAM normally exhibits a soft failure and causes flakiness in the computer's operating system. This risk can be minimized by having multiple sticks of RAM in the server and a few additional sticks on a parts shelf incase a stick fails.

Hard Drive – The hard disk has a high risk of failure because many drives have a warranty of 3 years. Hard disks are mechanical devices and are very precision based. Chances are that when the hard disk fails, it will exhibit a hard failure and completely take the server down. To prevent this kind of a failure from affecting the system, it is advisable that the server runs a RAID 0 array that will effectively copy the data on the server to two physical hard disks at the same time so that if one fails, the other will continue to function. It is also advisable to use two hard disks of different manufacturers to limit the chance of a manufacturing defect.

Network Interface Card (NIC) – There is a low risk here because occasionally network cards do fail. To prevent this scenario, it is advisable to have 2 NICs in the server with failover enabled.

Server Location is another concern when taking into account the risks of the system. We will examine the different hosting locations of the system below.

Locating the server at the CHC involves a medium risk. The server could become inaccessible to the world for more than 10 minutes due to the lack of technical staff on site. In addition, if the server fails on the weekend, someone may not be on site for up to 48 hours to fix the server causing a major outage of the web site. The CHC will also need to have an on call

administrator that is able to solve technical issues with the server hardware itself. In addition to hardware concerns, there is also no redundant backup to the internet at CHC. Therefore, if the internet does go down at the CHC, the website will also become inaccessible. Finally, if there is a fire or natural disaster at the CHC location, the server could be taken down for months and backups may be stored locally which also could be destroyed.

Locating the CHC server in a datacenter will involve a low risk. The biggest hurdle to overcome with this location is HIPPA requirements since other personnel will have physical access to the server (and the data on it). Although the staff at the datacenter will need to be authorized to access the server, this could cause concerns. On the upside, there are always redundant connections and power at datacenters in general along with technical staff on site 24x7 so the risk of outages is much lower. Also natural disasters at a datacenter could happen but are highly unlikely if choosing a datacenter that is in a relatively safe area.

With the internet comes a low to medium risk of a DoS (Denial of Service Attack). This is when hundreds of thousands of computers begin requesting data from the server simultaneously. The server can't keep up and dies! Data centers are equipped with routers that can mitigate (redirect) the attack to other connections that are black holes per say.

Software Related risks are another concern to implementing our system.

If Server compromised through exploited software, all the data on it is at the disposal of the attacker. This could pose a very high risk. The attacker may choose to run IRC (internet relay chat) related software on the server to attack another network causing even more problems. This is why the software solution must be thoroughly tested to prevent against such attacks to prevent unauthorized access to the private data.

Server upgrades pose a low risk. Unfortunately, updates sometimes will break existing software and render it not useable. To prevent this, keeping the server at a version behind the latest is never a bad idea. New releases generally are known for having bugs for a few days that are patched and these patches will normally fix any possible issues that could break the website.

Managing Changes/Change Request Form

Attached on the following page is the Change Request Form, this form is strictly required for any changes to this specification or later revisions. This formalizes the process for any system change that CHC may want to make to the system. This form will be submitted to a committee where it will be analyzed for feasibility and utility/value to the system. If the request seems reasonable then a member of the team will be assigned as sponsor and serve as a liaison for the change request, at this point the request will be considered a project and assigned a project number. The project sponsor should meet with CHC to design a formal project specification addendum document before any other work is done, the project sponsor may consult with CHC and cancel the project if it is deemed that there is insignificant need or information for the request to be fulfilled. The project sponsor will coordinate work.

Change Request Form

Request
Summary/Title:_____

Date Requested _____

Milestone/Release Goal: _____

Requester _____

Component: _____

Type of Request

[ ] Bug fix

[ ] User Enhancement

[ ] Behavior/Flow Change

[ ] Feature Addition

[ ] Architectural

Priority:

[ ] Urgent

[ ] Important

[ ] Normal

[ ] As-Needed

[ ] Low

Request Justification/Benefits Statement:

_____
_____
_____
_____
_____

Request Description/Details:

_____
_____
_____
_____
_____
_____
_____

CHC Management Sign-off: _____ Date:_____

Technical Team Sign-off: _____ Date:_____

Cross Reference Listing

The following table shows the functional requirements and their capabilities which will work after the completion of website. Each Requirement is assigned one number, which can be used while referring to the functional requirement during the developmental process.

Assigned Number	Functional Requirement	Capabilities
1	Home Page	Displayed when a user browses the website, with bunch of links which will take to other pages.
2	Login	It will display a username and password field that will allow users to login to the system.
3	Forms	It will display various forms such as complaint/feedback form, form for volunteering, employment form, etc.
4	Donation/Auction	It will allow users to donate money through the PayPal.
5	Event Calendar	It will let the user the various important dates for various events.
6	General Info	It will give the general detail of CHC, such what they do, their purpose, mission etc with no login required.
7	Maps	It will display the map and the directions to get to CHC and no login required.
8	Gallery	It will display the pictures of the recent events presented in the form of thumbnail and no login is required to access pictures.
9	Forums	It will display the various tabs available which are the links to other places on website.
10	Schedule	It will display the various schedules like the student schedule, volunteer schedule, about various therapy schedules.
11	Medical/Education Records	It will have the records of the various students which include therapy, education & various other useful details.
12	Contact Us	It will have the various ways you can contact CHC like email, phone number, etc.

Integration Thread

Requirements often change. Rather than taking the project to completion, as the waterfall model suggests, only to find out a module was not needed or a large portion of the project was misunderstood, we intend on delivering the project in iterations. Developing the software incrementally allows us to take advantage of information gathered at previous iterations enabling us to backtrack more easily if necessary.

In the first iteration we plan on delivering a stable and flexible subset of the system. Our main goal is the development of a highly modular framework which is easily extensible upon which the internal and external site can be built. At later stages of development, we will therefore be able to work in parallel, each developing modules independent of each other leading to faster delivery time.

That being said, our menu system will allow for expansion. The external site will display content from a variety of options, including but not limited to general information, donations, a map and directions, an event calendar, a gallery, and contact/volunteer forms. The external site serves as the portal for all visitors and the starting point for authorized users. The aforementioned options have been chosen to adequately meet the needs and deficiencies of the CHC Learning Center website.

The basis for the internal site is a modular selector system on which all of the options for every user will be incorporated. Upon authentication, the menu system will adapt to the user based on their permissions. For this stage of the design we will implement at least one module, which will allow for the download of forms. The next tentative module will be enable feedback between the teacher and the parents. This will replace the current paper journal that every student carries with them.