Software Design Document for the `ConMan`

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Contents

1 Introduction

This software design document provides a description of the `ConMan` application. In addition to describing the basic user interface design, the client-server interface and database description are also provided here.

1.1 Goal and Purpose

The purpose of `ConMan` is to provide a simple, web-based task-management application that can be used by both individuals and teams. The user interface should be easy to learn without hiding any of the core features of `ConMan`. The applications and its data should be protected with controls such as permission checking to ensure that data is not leaked and/or corrupted.

1.2 Core Features

The core features of `ConMan` include:

- Ability to register as a user
- Ability to define teams of users
- Ability to create, view, update, and delete project tasks
- Ability to create, view, update, and delete checklists associated with tasks
- Ability to register for notifications (via the application and via email) of upcoming deadlines
- Ability to view deadlines through a calendar interface

1.3 Major Constraints

The most limiting constraint is time. Due to time constraints, all development and testing must be completed within a 2 month period. Another constraint relates to the team's web development experience. Some on the team has little web development experience and even lower experience with the technologies that will be used (ASP.NET, jQuery, etc.).

1.4 Intended Audience and Reading Overview

This document is intended for individuals involved in the design and implementation of the `ConMan` web application. Stakeholders and customers may also want to read this document with the goal of ensuring that the product is being developed to their requirements. This document can be read in a sequential manner or by individual sections in any order. Below is a list of sections along with a short description:

- Architectural Design (Section 2)

  - The two major components of ConMan's Client-Server architecture are discussed.

- Data Design (Section 3)
  - The database tables are defined and the data transactions are described.
- User Interface Design (Section 4)
  - The general layout for the main page of the web application is depicted through the use of multiple wireframes.
- Restrictions, Limitations, and Constraints (Section 5)
  - This section specifies the browsers to be supported by the initial release of ConMan and the application's reliance on internet connections.
- Testing Guidelines (Section 6)
  - A variety of test cases are presented along with their expected results.
- Appendices (Section 7)
  - This section contains a list of definitions of terms used throughout the document.

2 Architectural Design

2.1 Overview

ConMan is divided into two major components: the client-side user interface, and a server-side application and database. The client-side communicates with the server using HTTP requests sent through an internet browser. ConMan utilizes the Client-Server architecture and allows multiple clients to concurrently access the server.

2.2 Client-Server Interaction

Data and user interactions are passed between the database, server, and clients through a MVC architecture.

The ConMan database will maintain the data for the ConMan application. The database will have no direct interaction with the clients and is only accessible through an interface with the server. Requests made to the database will occur in a First-Come, First-Served manner in order to preserve data consistency.

The ConMan server parses HTTP requests made by the clients and will interface with the database as needed. The server itself will be stateless and will not maintain user or application data after a request is handled. Data passed between the client and server will be in the JSON format.

2.3 Basic Context

The "basic context" of ConMan is where a user can only take actions that affect their personal account. Every ConMan user has a basic account, and consists of the tasks and checklists that are not a part of external teams or groups. When a user opens the ConMan application by pointing their browser to the ConMan URL, the initial user context is the basic context. The basic context is also the starting context when an account is created.

2.3.1 Interface Description

Fields entirely enclosed in [] brackets are to be considered optional.

```
CreateAccount(   LastName:String,
                 FirstName:String,
                 E-mail:String,
                 Password:String);
```

```
ModifyAccount(   UserId:Int,
                 [LastName:String],
                 [FirstName:String],
                 [E-mail:String],
                 [NewPassword:String],
                 OldPassword:String);
```

```
CreateTask(  UserId:Int,
             TeamId:Int,
             DueDate:date,
             Description:String);
```

```
ModifyTask(  UserId:Int,
             TaskId:Int,
             TeamId:Int,
             [DueDate:date],
             [Description:String],
             [Completed:Boolean],
             [Note:String]);
```

```
CreateChecklist(      UserId:Int,
                      TeamId:Int,
                      TaskId:Int,
                      DueDate:date,
                      Fields:[{CheckListId:Int,  FieldId:Int  DueDate:date,
    Description:String}],
                      Description:String);
```

```
ModifyChecklist(  UserId:Int,
                  CheckListId:Int,
                  TaskId:Int,
                  [DueDate:date],
                  [Description:String],
                  [Fields:[{CheckListId:Int,  FieldId:Int  DueDate:date,
    Description:String}]],
                  [CompletedField:Boolean[]],
                  [Completed:Boolean],
                  [Note:String]);
```

2.3.2 Processing Details

The `CreateAccount` interface is used when the user first creates an account with the `ConMan` system. The server will validate the input fields given by the user. If all fields are valid, the server will update the database records and add a new user. A team is automatically generated with a team-Id equivalent to the user-Id. If the server successfully validates the user fields and successfully updates the database, the user-Id generated by the database will be returned. Otherwise, an error code will be returned.

`ModifyAccount` functions similarly to `CreateAccount`, except fields that `NULL` can be given for fields that are not being updated and are not required to identify the action.

`CreateTask` adds a new task for the user. In the basic context, the `TeamId` will be the `UserId`. After verification by the server and a successful database update, the task-Id will be returned. Otherwise, an error code will be returned.

`ModifyTask`, like `ModifyAccount` allows texttttNULL values to be given for fields that are not being updated. A success or error code will be returned.

`CreateChecklist` will add a checklist to a task owned by a user. In the basic context, the `TeamId` will be the `UserId`.

`ModifyChecklist` This interface function is invoked to modify an existing checklist.

2.3.3 Restrictions/Limitations

For every interface action, the server must validate the given fields against the database to ensure the user making the request has the appropriate permissions.

2.3.4 Performance Issues

Requests made by the clients to the server are subject to time-out restrictions. If the server takes too long to process an interface request and the client-server connection is ended, the client will assume the transaction failed. Under such a failure condition, the client will send a "revoke" notice to the server indicating that any database changes made on behalf of the timed-out request must be rolled-back.

2.3.5 Design Constraints

In order to maintain data consistency, either only one database should be used, or a very robust data-duplicating effort must be made to ensure consistency across multiple databases. Version one of `ConMan` will only support a single database back-end.

2.4 Team Context

The team context is conceptually very similar to the basic context, except administrator privileges are required to modify the team account. Administrator privileges are automatically given to the creator of a team. Tasks associated with the team can be modified by all team administrators and all users belonging to the team who have been assigned to the task.

2.4.1 Interface Description

Fields entirely enclosed in [] brackets are to be considered optional.

```
CreateTeam(      TeamName:String,
                 E-mail:String,
                 Password:String);
```

```
ModifyTeam(      TeamId:Int,
                 [TeamName:String],
                 [E-mail:String],
                 [NewPassword:String],
                 OldPassword:String);
```

```
CreateTeamTask( UserId:Int,
                TeamId:Int,
                AssignedUsers:Int[],
                DueDate:date,
                Description:String);
```

```
ModifyTeamTask( UserId:Int,
            TaskId:Int,
            TeamId:Int,
            [AssignedUsers:Int[]],
            [DueDate:date],
            [Description:String],
            [Completed:Boolean],
            [Note:String]);
```

```
CreateTeamChecklist(    UserId:Int,
                        TeamId:Int,
                        TaskId:Int,
                        AssignedUsers:Int[],
                        DueDate:date,
                        Fields:[{CheckListId:Int, FieldId:Int DueDate:date,
    Description:String}],
                        Description:String);
```

```
ModifyTeamChecklist( UserId:Int,
                   CheckListId:Int,
                   TeamId:Int,
                   TaskId:Int,
                   [AssignedUsers:Int[]],
                   [DueDate:date],
                   [Description:String],
                   [Fields:[{CheckListId:Int, FieldId:Int DueDate:date,
    Description:String}]],
                   [CompletedField:Boolean[]],
                   [Completed:Boolean],
                   [Note:String]);
```

2.4.2 Processing Details

The processing details for the team context differ from the basic context only in the fact that an additional check must be performed to ensure the user making the request has the correct team permissions to do so.

2.4.3 Restrictions/Limitations

There are no additional restrictions or limitations.

2.4.4 Performance Issues

There are no additional performance constraints.

2.4.5 Design Constraints

There are no additional design constraints.

3 Data Design

The server-side database provides persistent data storage for the ConMan application. When a user connects to the ConMan application through a web-browser, the data associated with that user is retrieved by the server from the database and sent as a JSON encoded string back to the user for client side processing. To preserve consistency, client-side processing will only handle representation of the data (i.e. the "view"). Any create, update, or destroy operations on the data must be validated by a server request (interfaces defined below).

All data held outside of the database - client and server-side - will not be preserved by the ConMan application when the user navigates away from the ConMan page.

3.1 Database Design

The following database table descriptions describe the data interactions and dependencies.

User Table
UserId:Int (unique)
LastName:String
FirstName:String
Email:String
Password:String

Team Table
TeamId:Int (unique)
TeamName:String
TeamEmail:String

Team Member Table
TeamId:Int
UserId:Int
Admin:boolean

Task Table
TaskId:Int
TeamId:Int
DueDate:date
Description:String

CheckList Table
ChecklistId:Int
TaskId:Int
DueDate:date
Description:String

CheckList Fields
ChecklistId:Int
FieldId:Int
DueDate:date
Description:String
Completed:boolean

CheckList Notes
ChecklistId:Int
FieldId:Int
Date:date
UserId:Int
Note:String

Task Notes
TaskId:Int
UserId:Int
Date:date
Note:String

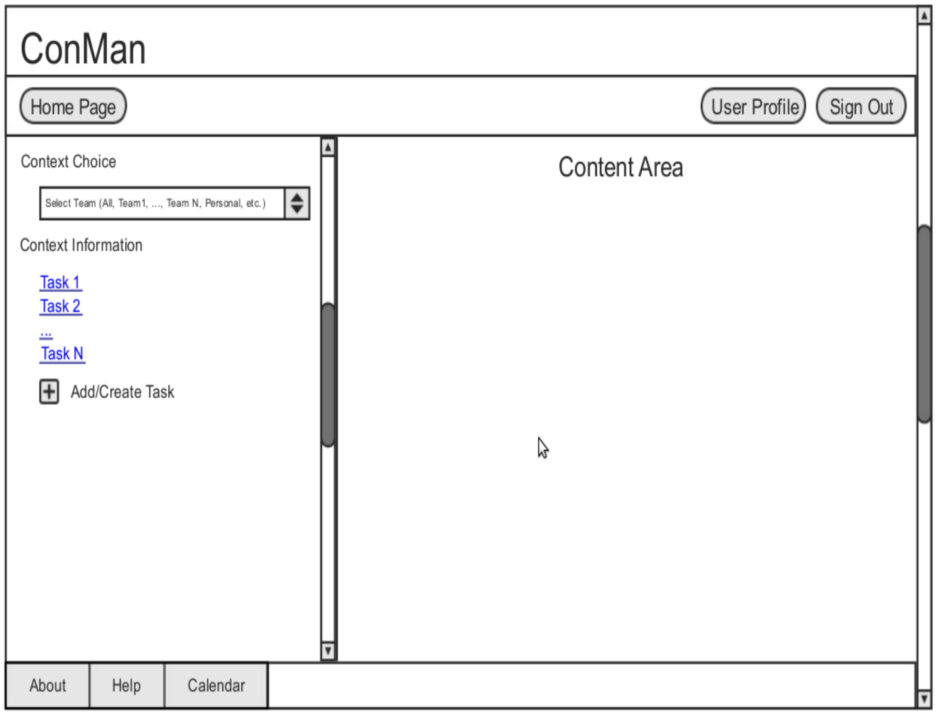
User Tasks
UserId:Int
TaskId:Int

User CheckLists
UserId:Int
ChecklistId:Int

4 User Interface

The user interface of `ConMan` is dominated by the use of the ”main screen” (shown below). The main screen consists of four distinct parts, the top bar, the bottom bar, the left pane, and the content area. A general overview of some of the user interface designs follows.

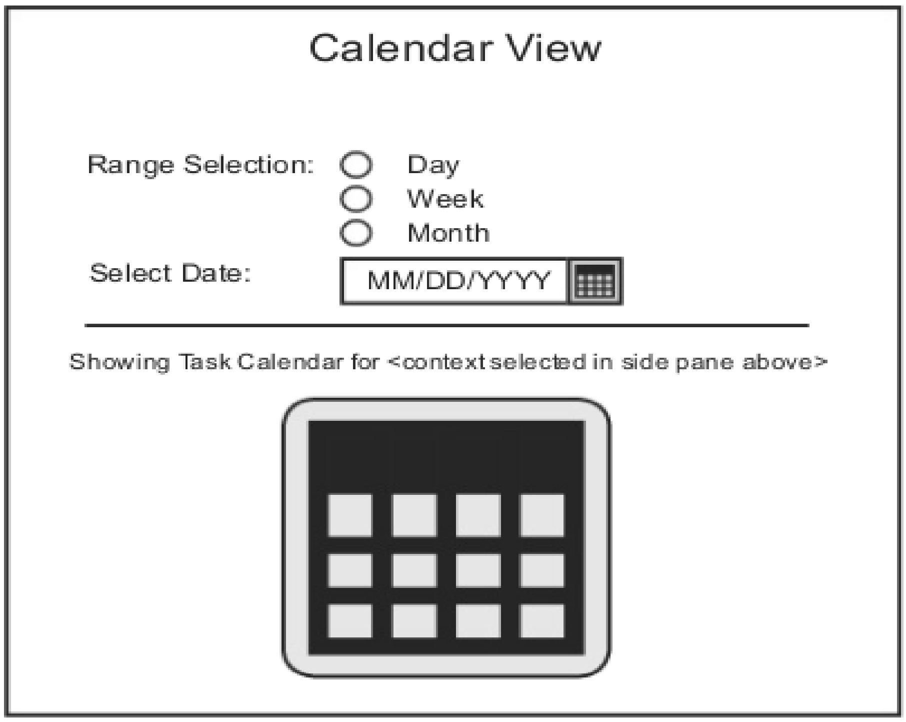
4.1 Main Screen



As can be seen here, the top and bottom bars are populated with navigational tools. The left pane allows the user to select which context they would like to operate in (personal or team context) and displays options relating to the selected context. The content area then has three primary views

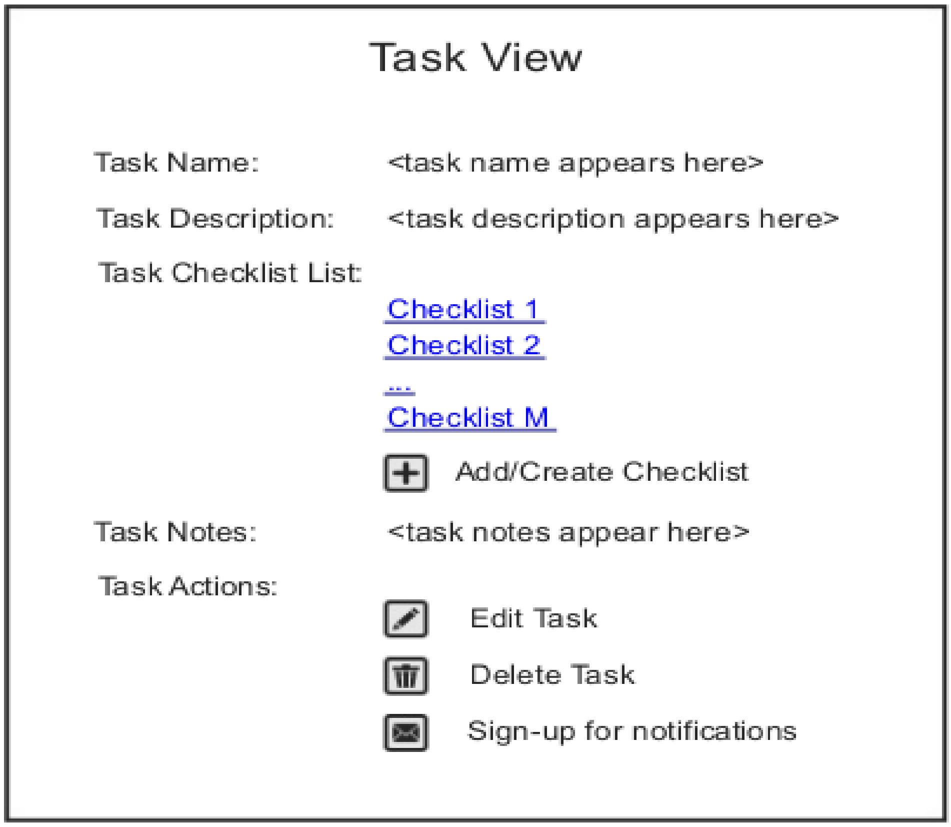
4.2 Content Area

4.2.1 Calendar View


Calendar View
Range Selection:
Day
Week
Month
Select Date:
MM/DD/YYYY
Showing Task Calendar for <context selected in side pane above>

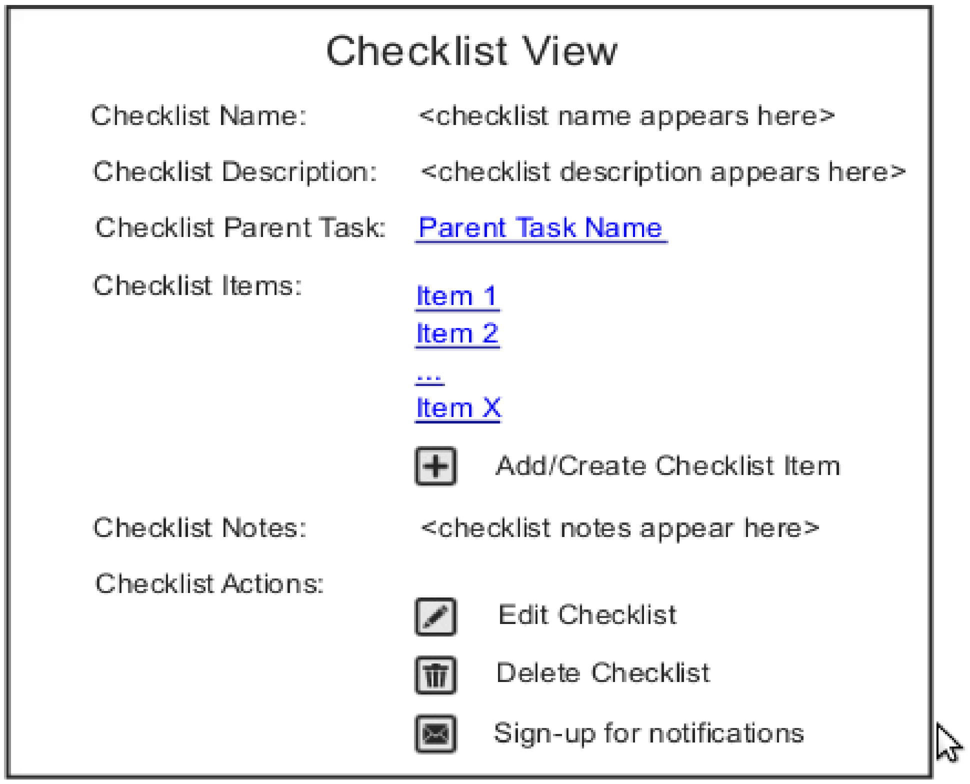
The calendar view gives the user an opportunity to see when the tasks and checklists are due. If the user has selected the personal context in the left pane, then only the personal context tasks will be displayed. The tasks and checklists appearing in the calendar will be hyper-links that navigate the content area to the task or checklist view respectively.

4.2.2 Task View



The task view will show the task name, description, checklists, notes, and available actions for the selected task. For tasks which are assigned to teams, non-administrative users will not be able to delete a task. Non-administrative users will still be able to see the administrative actions, but the action link will be obscured (i.e., grayed out).

4.2.3 Checklist View

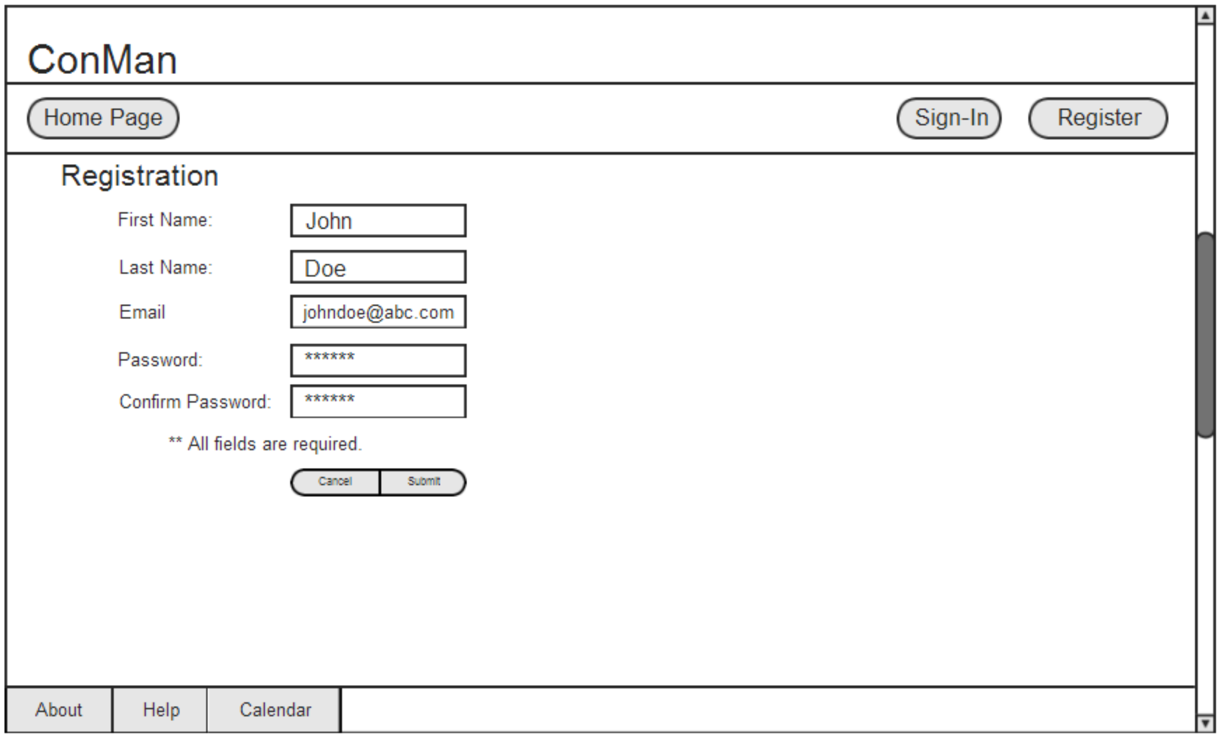


Checklist View

Checklist Name:	<checklist name appears here>
Checklist Description:	<checklist description appears here>
Checklist Parent Task:	Parent Task Name
Checklist Items:	Item 1 Item 2 ... Item X Add/Create Checklist Item
Checklist Notes:	<checklist notes appear here>
Checklist Actions:	Edit Checklist Delete Checklist Sign-up for notifications

A checklist is conceptually very similar to a task and displays similar items. Again, not every action will be available to non-administrative users.

4.3 Registration Screen



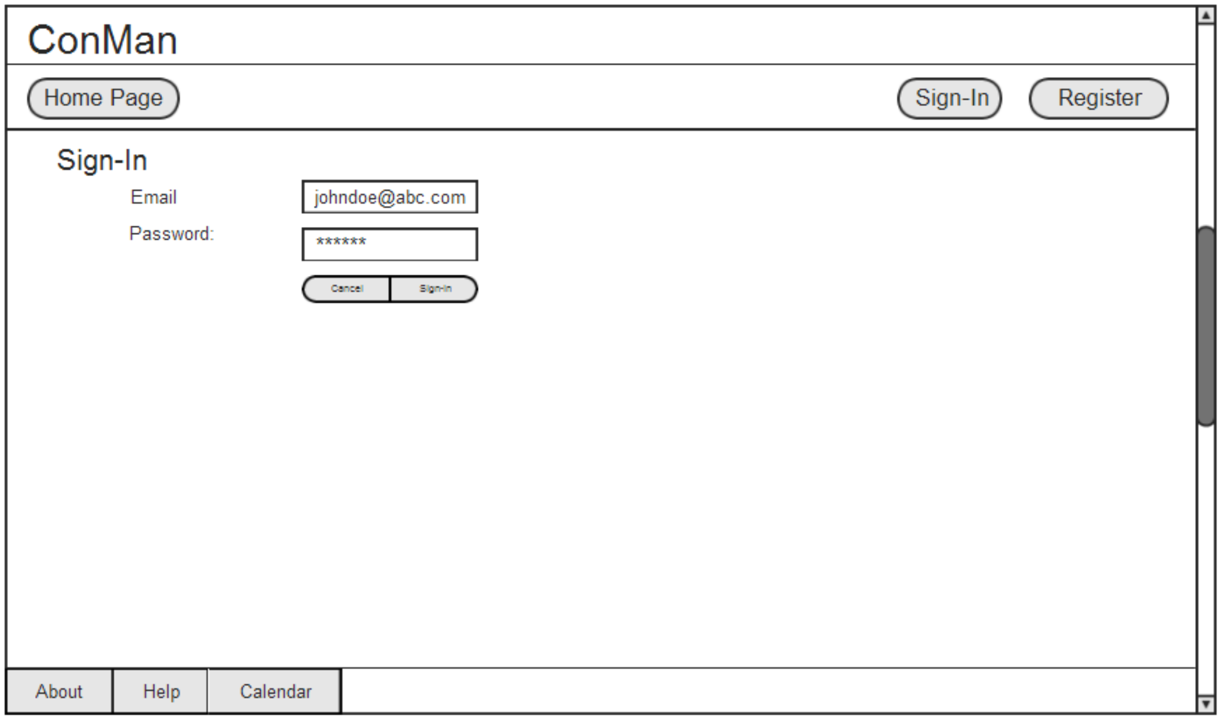
Registration

First Name:	John
Last Name:	Doe
Email	johndoe@abc.com
Password:	******
Confirm Password:	******

** All fields are required.

Users must create an account for `ConMan` in order to perform a variety of function with `ConMan` such as registering for email notifications. Users must supply their first and last names, email, and password in order to register.

4.4 Sign-In Screen



If an user has an account in `ConMan`, the user can sign-in using the email and password provided during the creation of their account.

5 Restrictions, Limitations, and Constraints

As detailed in the SRS, the user interface will only be supported for the Chrome and Firefox desktop web-browsers. Support for different browsers and devices will be added in future versions of `ConMan`.

An internet connection is also required to use `ConMan`, and there are no plans to implement off-line support. Because `ConMan` is intended to assist coordination between teams (particularly software development teams), a network connection is essential.

6 Testing Guidelines

Testing will be integrated throughout the development of `ConMan`. Components will be tested individually before being integrated into the system for system testing. A database of test cases, test results, and action required will be maintained by the developers to ensure `ConMan` satisfies all of its major requirements.

6.1 Testing Cases and Expected Results

A comprehensive test plan will ensure `ConMan` is delivered as a stable product. The `ConMan` tests will include tests for:

- account creation. When a user creates an account the user e-mail must not already be associated with a `ConMan` account and all required fields completed.
- account login. When returning to `ConMan`, the user must correctly fill all required fields on the login screen.
- team creation. All fields associated with team creation must be completed when creating a new `ConMan` team. E-mail fields must be properly formatted.
- adding tasks and checklists. When creating tasks and checklists, the user must complete all required fields. If a due-date is required, the user must pick a date in the future. When adding tasks to a team account, all team members must be able to view the new task.

The test-plan document will describe these and other tests in more detail.

7 Appendices

7.1 Definitions

- Client-Server: A system architecture where a central server provides data to one or many networked computers (these are the clients).
- MVC: A design pattern commonly used for building interactive applications. The Model, View, and Controller components form the structure of the MVC pattern. The Model is a representation of the underlying application data, the View is a collection of objects representing the user interface elements (buttons, list, etc.), and the Controller is a connection between the Model and the View.
- HTTP: Hypertext Transfer Protocol (HTTP) is a standard for communication between servers and web browsers.
- URL: Uniform Resource Locator (URL) is a string of characters denoting the location of an entity (e.g., a website or an image) within the Internet.
- JSON: JavaScript Object Notation (JSON) is a text-based standard for data interchange in a human-readable format.