Casa Domus

CMSC 447

Software User Manual (SUM)

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1 Scope

1.1 Identification

This Software User Manual (SUM) document applies to Casa Domus 1.0, a web-based home finding software that utilizes user inputs to generate a map with a color gradient for each county in the lower-forty eight states of the United States of America, corresponding to the closeness that the conditions in each county has with the user's preferences.

1.2 System overview

The purpose of this piece of software, which should run on any system that is capable of any of the two following web browsers, Chrome version 60.0+, and Firefox version 58.0+, is to enable users to easily find housing locations based off their preferences. The web-based software should perform these tasks by using user preferences obtained from a questionnaire to search through information obtained through various APIs, .csv files, and a database, which display to the user a map that is gradiented based off the comparability of the housing options in various areas to the user preferences. The project sponsor is Prof. Charles Nicholas. The development team is Casa Domus. This software was developed over the spring of 2018.

1.3 Document overview

This is the Software User Manual (SUM), which functions to inform users of how to utilize the product. The product is a web-based software that runs in on Chrome version 60.0+ and Firefox 58.0+, and as such can be accessed via a browser. The website itself does not handle any user information, and does not share any information about the user using the website.

2 Referenced documents

Document	**Content Referenced**
Casa Domus Software Requirements Specification (SRS)	Requirements in this documents are all referenced from the Casa Domus SRS
Casa Domus Software Design Description (SDD)	CSCI's in this document are all referenced from the Casa Domus SDD
Casa Domus Software Test Description (STD)	Tests and Test cases in this document are all referenced from the Casa Domus STD
Casa Domus Software Test Report (STR)	Test Results in this document are all referenced from the Casa Domus STR

3 Software summary

The product is a web-based software, which has the purpose of providing knowledge about how well each county in the lower-forty eight states of the United States of America matches a user's preference for his/her choice of where to live.

3.1 Software inventory

For the purposes of running the product, one must download a browser supported by the product, including either of the following: Google Chrome version number 60.0+ or Firefox 58.0+. Since the product only requests for opinion-based and non-sensitive information, and does not store any information in manners that may potentially associate them with the user directly, there are low security and privacy risks for the user. However, each file in the product may have different security and privacy considerations. The product performs most of its interactions with information in the form of reads rather than writes. In case of emergency, since little information is being written out from the product, and is mostly done in the form of caching, the risk for any information loss is small.

3.2 Software environment

Resources required for a user to install and run the software:

a. Hardware Equipment
   - A Laptop or Desktop capable of supporting either Chrome Version 58.0+ or Firefox 60.0+
b. Communications Equipment
   - An active internet connection
c. Required Software
   - Chrome Version 60.0+
   - Firefox Version 58.0+

3.3 Software organization and overview of operation

This paragraph shall provide a brief description of the organization and operation of the software from the user's point of view. The description shall include, as applicable:

3.3.1 User Perspective

a. Page 1
   i. "Begin" Button: Leads user to the questionnaire
b. Page 2
   i. "Current Household Income" Slider: A slider with a minimum of $22,045 and a maximum of $134,609. User can move the slider to their current (or non current) household income. This data is used for finding the appropriate county.
   ii. "Property Value" Slider: A slider with a minimum of $33,000 and a maximum of $871,500. User can move the slider to the current amount

of property they can (or can not) afford. This data is used for finding the appropriate county.

iii. "Cost of Living Index (COLI)" Slider: A slider with a minimum of 85.1 and a maximum of 155.1. User can move the slider to their preferred COLI for a state. This data is used for finding the appropriate county.

iv. "Spend on Rent per Month" Slider: A slider with a minimum of $456 and a maximum of $2,704. User can move the slider to the current amount of rent they can(or can not) afford. This data is used for finding the appropriate county.

v. "Submit" Button: After specifying their preferences with the sliders, the user can hit submit to go to the maps page..

c. Page 3

i. Google Map - Map that displays all the counties, and after the submit button is hit, color codes them from blue to red, the blue counties being closest to the user's preferences and red for counties that are furthest away. You are able to zoom in on the map as well as click on each county for its name.

ii. A list of the top 5 counties are displayed, this list is clickable and will focus on the county on the map if coordinates are available (See Appendix A for counties with missing coordinates).

3.3.2 Performance characteristics that can be expected by the user, such as:

d. Types, volumes, rate of inputs accepted

i. Input via button presses using a mouse

ii. Input via sliders using a mouse

iii. Interaction with Google Maps using a mouse

e. Types, volume, accuracy, rate of outputs that the software can produce

i. Renders a questionnaire after clicking the "Begin" button

ii. Outputs the five closest counties to the user's preferences

iii. Outputs a Google Map with a gradient at the county level

iv. Outputs info windows for top 5 counties

f. Typical response time and factors that affect it

i. Sliders: Instantaneous

ii. Buttons:

1. "Begin": Approximately .5 ms to complete fade animation from start page to questionnaire.
2. Generating the results and map via the "Submit" Button: 5 - 7 seconds.

g. Limitations, such as number of events that can be tracked

i. Sliders: Can not exceed the set minimum or maximum values. These minimum and maximum values are set by the counties whose median values define the upper and lower limits of valid input.

h. Error rate that can be expected

i. Exactly 12 counties are missing from the map (See Appendix A). These counties are not given as results to the user. Counties that are show in black on the map are lacking appropriate information and thus results can not be shown.

3.4 Security and privacy

Since the project does not store any sensitive information, and all county information used by the webservice is available freely to the public by their associated government agency (See section 7 of the Casa Domus SDD for all sources of data), there are minimal concerns for project security and privacy.

4 Access to the software

The instructions for how to load the product have been provided as follows:

4.1 First-time user of the software

4.1.1 Equipment familiarization

The web service is designed to work on a desktop client running either Google Chrome Version 60.0+ or Mozilla Firefox Version 58.0+. Users should access the webservice from the specified browsers with a laptop or desktop client.

4.1.2 Access control

a. The website does not support user sign in/sign out.
b. The website itself does not handle any user information, and does not share any information about the user using the website.
c. The website does not generate any data that involves security and privacy considerations.

4.2 Initiating a session

To begin a session:

1. The user shall open survey.html using one of the supported browser types. The URL of survey.html will depend on where the file is currently being hosted. For example, if the server is hosted at Internet Protocol (IP) address 127.0.0.1, the user shall type into their browser http://127.0.0.1/survey.html to access the first page.
2. The landing page of the product is now open and a session has begun.

5 Processing reference guide

5.1 Capabilities

The website contains two pages in general. The first page is a welcome page with a “begin” button that transitions into a questionnaire where users can input their ideal living preferences through the use of sliders. Upon questionnaire submission the second page containing a google map, the top 5 closest matched counties, and sliders corresponding to the same preference options from the initial questionnaire will render. Users can view the results of their initial submission and modify their preferences to start a new search.

5.2 Conventions

The product fills the county shapes with different colors depending on the county’s “score.” These scores are calculated in the backend to represent how the counties match the user’s preference. The list of counties is sorted from least to greatest on their scores. A county’s index in the sorted list is what determines its color. The first county on the list will have a hue close to 260° (Blue) on the HSL color model while the last county on the list will have a hue close to 0° (Red) on the HSL color model.

5.3 Processing procedures

5.3.1 Welcome Screen

This is just a welcome page of the product. Clicking the “begin” button will lead user to the questionnaire page.

5.3.2 Questionnaire Screen

This is the questionnaire screen. See section 3.4-a-2) for the descriptions of the sliders. Users can set their preferences of each field by dragging the corresponding slider. Upon clicking the “submit” button, the values on the sliders will be sent to the map page as URL parameters to calculate the score of each county. When calculations are completed, users are led to the map screen.

5.3.3 Map Screen

This is the map screen. See section 3.4-a-2) for the description of the map. The sliders on the side correspond to values identical to those in the questionnaire screen. The “submit” button will submit the current values on the sliders and will rerender the map after calculation.

5.4 Related processing

The first thing the web service renders is the questionnaire. Here, the system obtains user preferences for living conditions. User input values from the sliders on the questionnaire are collected by the AngularJS framework and are sent to an AngularJS controller within survey.html. They are forwarded to the maps page by the use of URL parameters.

The system must obtain all county information before services can proceed on the maps page, which is rendered on submission of the initial questionnaire. This processing begins behind the scenes once map.html completes loading. First, the .csv string in the 'data.js' file is sent through the Papa Parse CSV to JSON parser, and a JSON object containing all of the county data is created. The entire process takes mere seconds to occur (usually around 1.20 ms to 2.0 ms). The latency is noticeable to the user and has been noted by the developers, but a delay of 1 to 2 seconds is well within the required time for the web service to respond with a result.

After the county data is obtained in map.html, the system then extracts the user input from the URL. The user input values are normalized and compared with normalized county data for all lower 48 states of the US. A score is assigned to each county on the basis of a Manhattan distance function (For more information on the normalization and scoring process, see section 4 'CSCI detailed design' of the Casa Domus SDD). The lower a county's score is, the closer of a match it is to the preferences that the user specified.

The list of counties is then sorted by this score, the gradients on the map are colored according to their index on the list, and the top 5 counties are taken from the list to be shown on the maps page. By the end of these processes, the map page is rendered completely in just under 5 seconds (averages around 4.48 ms during testing), which is still within the required time for the web service to respond with results.

5.5 Risk and Data Loss

Due to the nature of the Casa Domus webservice, potential risk from a website failure is low. Sensitive account information is not handled by the webservice and all county data acquired is freely available from their respective US government agency. Risk for data loss or leakage is not a concern. Therefore all county data used and any user input will not be saved in the case of an emergency or system failure. They are not critical for the function and operation of the web service.

6. Notes

6.1 Assumption of Hosting

This SUM assumes that all the files associated with this web service are hosted on a web server (e.g. apache, nginx, etcetera). This SUM also assumes that the main HTML (Hypertext Markup Language) files (survey.html, map.html) must be publicly accessible from this web server.

6.2 Definition of Acronyms

Included in this section are all terms and acronyms used in this document:

Term	**Meaning**
AngularJS	Angular Javascript web framework

CSCI	Computer Software Configuration Item
SRS	Software Requirement Specification
SDD	Software Design Description
STD	Software Test Description
STR	Software Test Report
PLAT	Platform
FUNC	Functional
PER	Performance
GUI	Graphical User Interface
IP	Internet Protocol
HTML	Hypertext Markup Language
JSON	Javascript Object Notation
GeoJSON	Geographical Javascript Object Notation

Appendix A: Counties with Missing Data

These counties are excluded from the final results because they are missing one or more of the following: Median Household Income, Median Property Value, State Cost of Living Index, Median Monthly Cost of Rent for a One Bedroom Unit, or Average Summer and Winter temperatures. This list is 12 counties long.

San Francisco, CA
Broomfield, CO
Denver, CO
LaSalle, IL
LaSalle, LA
Nantucket, MA
Doña Ana, NM
Carson City, NV
Philadelphia, PA
Oglala Lakota, SD
Kenedy, TX
Loving, TX

Appendix B: Counties with Missing Center Coordinates

These counties are excluded from being focused on the map from the suggestions list because they are missing coordinate data that indicate the center of the county. This list is 284 counties long.

Autauga County, AL
Baldwin County, AL
Barbour County, AL
Bibb County, AL
Blount County, AL
Bullock County, AL
Butler County, AL
Calhoun County, AL
Chambers County, AL
Cherokee County, AL
Chilton County, AL
Choctaw County, AL
Clarke County, AL
Clay County, AL
Cleburne County, AL
Coffee County, AL
Colbert County, AL
Conecuh County, AL
Coosa County, AL
Covington County, AL
Crenshaw County, AL
Cullman County, AL
Dale County, AL
Dallas County, AL
DeKalb County, AL
Elmore County, AL
Escambia County, AL
Etowah County, AL
Fayette County, AL
Franklin County, AL
Geneva County, AL
Greene County, AL
Hale County, AL
Henry County, AL
Houston County, AL
Jackson County, AL
Jefferson County, AL
Lamar County, AL
Lauderdale County, AL
Lawrence County, AL
Lee County, AL
Limestone County, AL
Lowndes County, AL
Macon County, AL
Madison County, AL
Marengo County, AL
Marion County, AL
Marshall County, AL
Mobile County, AL
Monroe County, AL
Montgomery County, AL
Morgan County, AL
Perry County, AL
Pickens County, AL
Pike County, AL
Randolph County, AL
Russell County, AL
Shelby County, AL
St. Clair County, AL
Sumter County, AL
Talladega County, AL
Tallapoosa County, AL
Tuscaloosa County, AL
Walker County, AL
Washington County, AL
Wilcox County, AL
Winston County, AL
Arkansas County, AR
Ashley County, AR
Baxter County, AR
Benton County, AR
Boone County, AR
Bradley County, AR
Calhoun County, AR
Carroll County, AR

Chicot County, AR
Clark County, AR
Clay County, AR
Cleburne County, AR
Cleveland County, AR
Columbia County, AR
Conway County, AR
Craighead County, AR
Crawford County, AR
Crittenden County, AR
Cross County, AR
Dallas County, AR
Desha County, AR
Drew County, AR
Faulkner County, AR
Franklin County, AR
Fulton County, AR
Garland County, AR
Grant County, AR
Greene County, AR
Hempstead County, AR
Hot Spring County, AR
Howard County, AR
Independence County, AR
Izard County, AR
Jackson County, AR
Jefferson County, AR
Johnson County, AR
Lafayette County, AR
Lawrence County, AR
Lee County, AR
Lincoln County, AR
Little River County, AR
Logan County, AR
Lonoke County, AR
Madison County, AR
Marion County, AR
Miller County, AR
Mississippi County, AR
Monroe County, AR
Montgomery County, AR
Nevada County, AR
Newton County, AR
Ouachita County, AR
Perry County, AR
Phillips County, AR
Pike County, AR
Poinsett County, AR
Polk County, AR
Pope County, AR
Prairie County, AR
Pulaski County, AR
Randolph County, AR
Saline County, AR
Scott County, AR
Searcy County, AR
Sebastian County, AR
Sevier County, AR
Sharp County, AR
St. Francis County, AR
Stone County, AR
Union County, AR
Van Buren County, AR
Washington County, AR
White County, AR
Woodruff County, AR
Yell County, AR
Apache County, AZ
Cochise County, AZ
Coconino County, AZ
Gila County, AZ
Graham County, AZ
Greenlee County, AZ
La Paz County, AZ
Maricopa County, AZ
Mohave County, AZ
Navajo County, AZ
Pima County, AZ
Pinal County, AZ
Santa Cruz County, AZ
Yavapai County, AZ
Yuma County, AZ
Alameda County, CA
Alpine County, CA
Amador County, CA
Butte County, CA
Calaveras County, CA
Colusa County, CA
Contra Costa County, CA
Del Norte County, CA
El Dorado County, CA
Fresno County, CA
Glenn County, CA
Humboldt County, CA
Imperial County, CA
Inyo County, CA
Kern County, CA
Kings County, CA
Lake County, CA
Lassen County, CA
Los Angeles County, CA
Madera County, CA
Marin County, CA
Mariposa County, CA
Mendocino County, CA
Merced County, CA
Modoc County, CA
Mono County, CA
Monterey County, CA
Napa County, CA
Nevada County, CA
Orange County, CA
Placer County, CA
Plumas County, CA
Riverside County, CA
Sacramento County, CA
San Benito County, CA
San Bernardino County, CA
San Diego County, CA
San Joaquin County, CA
San Luis Obispo County, CA
San Mateo County, CA
Santa Barbara County, CA
Santa Clara County, CA
Santa Cruz County, CA
Shasta County, CA
Sierra County, CA
Siskiyou County, CA
Solano County, CA

Sonoma County, CA
Stanislaus County, CA
Sutter County, CA
Tehama County, CA
Trinity County, CA
Tulare County, CA
Tuolumne County, CA
Ventura County, CA
Yolo County, CA
Yuba County, CA
Adams County, CO
Alamosa County, CO
Arapahoe County, CO
Archuleta County, CO
Baca County, CO
Bent County, CO
Boulder County, CO
Chaffee County, CO
Cheyenne County, CO
Clear Creek County, CO
Conejos County, CO
Costilla County, CO
Crowley County, CO
Custer County, CO
Delta County, CO
Dolores County, CO
Douglas County, CO
Eagle County, CO
El Paso County, CO
Elbert County, CO
Fremont County, CO
Garfield County, CO
Gilpin County, CO
Grand County, CO
Gunnison County, CO
Hinsdale County, CO
Huerfano County, CO
Jackson County, CO
Jefferson County, CO
Kiowa County, CO
Kit Carson County, CO
La Plata County, CO
Lake County, CO
Larimer County, CO
Las Animas County, CO
Lincoln County, CO
Logan County, CO
Mesa County, CO
Mineral County, CO
Moffat County, CO
Montezuma County, CO
Montrose County, CO
Morgan County, CO
Otero County, CO
Ouray County, CO
Park County, CO
Phillips County, CO
Pitkin County, CO
Prowers County, CO
Pueblo County, CO
Rio Blanco County, CO
Rio Grande County, CO
Routt County, CO
Saguache County, CO
San Juan County, CO
San Miguel County, CO
Sedgwick County, CO
Summit County, CO
Teller County, CO
Washington County, CO
Weld County, CO
Yuma County, CO
Fairfield County, CT
Hartford County, CT
Litchfield County, CT
Middlesex County, CT
New Haven County, CT
New London County, CT
Tolland County, CT
Windham County, CT