CMSC 447

Software Requirements Specification (SRS)

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# Scope

This section shall be divided into the following paragraphs.

## Identification

This document pertains to client-side and server-side systems within Coastal Neighborhood Finder (CNF) and identifies their relationship to each other. The requirements of the client-side system is a web browser capable of viewing javascript and to be on the same network as the server-side system. The server-side system will run a web server and must be able to serve to the client side system.

The identified Computer Software Configuration items (CSCI) required for CNF are listed in the following way : (Identification) Name

(DATA) Data collector: Responsible for communicating between API’s.

(IMD) Interactive Map Display: Responsible for displaying a map to the client-side system.

(FORM) Search Form: Responsible for aggregating the information given by the user containing filters and a location.

(WEB) Web Server: Responsible for serving HTML from the server-side system to the client-side system and hosting an API to which the (FORM) sends the filters and location.

## System overview

The purpose of Coastal Neighborhood Finder (CNF) is to give the user an interactive map display with real estate information based on a search form given by the user. The client-side system will only provide the search data to tell the server-side system what information to send to the client-side system. The server-side system will collect data from various API’s and send the data to the client-side system.

The interactive map display will be using a Leaflet JavaScript package. The search form will communicate with the web server to retrieve the real estate information. The data collector will use a RESTful framework to communicate with the Zillow API, Yelp API, and the Census API. The web server will serve the HTML and provide an API for the data points on the interactive map display

## Document overview

This document describes the relationship of the software and the formal requirements. There are no privacy or security issues that will need to be considered in this document.

# Referenced documents

This section shall list the number, title, revision, and date of all documents referenced in this specification. This section shall also identify the source for all documents not available through normal Government stocking activities.

# Requirements

This section shall be divided into the following paragraphs to specify the CSCI requirements, that is, those characteristics of the CSCI that are conditions for its acceptance. CSCI requirements are software requirements generated to satisfy the system requirements allocated to this CSCI. **Each requirement shall be assigned a project-unique identifier to support testing and traceability and shall be stated in such a way that an objective test can be defined for it. Each requirement shall be annotated with associated qualification method(s) (see section** [**4)**](#_41mghml) **and traceability to system (or subsystem, if applicable) requirements (see section** [**5.a)**](#_vx1227) **if not provided in those sections.** The degree of detail to be provided shall be guided by the following rule: **Include those characteristics of the CSCI that are conditions for CSCI acceptance; defer to design descriptions those characteristics that the acquirer is willing to leave up to the developer.** If there are no requirements in a given paragraph, the paragraph shall so state. If a given requirement fits into more than one paragraph, it may be stated once and referenced from the other paragraphs.

This section will describe the CSCI items between the client-side and server-side systems. The following CSCI items will explain the purpose of the item, how the item will be tested, the acceptance test of the item, and the traceability of the item.

The requirements of CNF are as follows

1. The application shall be web-based.
2. The application shall run on the latest version of Firefox.
3. The application shall display all properties within the scope of the map as points.
4. The application shall display all coastal and near coastal communities located in Maryland and Delaware.
5. The application shall display property statistics.
   1. The application shall display the range of prices of the selected city distinguished by minimum and maximum prices.
6. The application shall display population statistics
   1. The application shall display the population of the selected city.
7. The application should display property listings within a selected city.
   1. The property listings should be displayed as a point on the map.
   2. The property listings within the selected city should display property price.
   3. The property listings within the city should display the number of bedrooms and bathrooms.
8. The application shall find the nearest real estate office to the selected city.
9. The real estate office shall be displayed as a point on the map.
10. The application shall save specific real estate listings on a per browser basis.
11. The application shall display the amenities near a selected city.
    1. The application shall display the Pools, Gyms, and Restaurants near the selected community.
    2. The application should display the Parks and Bike Paths near the selected community.
    3. The application shall allow the user to specify a radius for the amenities.
    4. The amenities shall be icons on the map.
12. The application shall be web-based
13. The application shall run on the latest version of Firefox
14. The user shall be able to search for property listings within a county in Maryland or Delaware.
15. The user shall be able to search for property listings within a Municipality in Maryland or Delaware.
16. The user should be able to search for property listings within a CDP in Maryland or Delaware.
    1. The property listings shall be displayed as a point on the map.
    2. The user shall be able to see all of the property listings that are within the scope of the map in a list.
    3. The user shall be able to see the information contained within a property listing point.
       1. A property listing point shall contain property statistics
       2. A property listing point shall contain population statistics for that municipality
    4. The user shall be able to see all of the realtor's assigned to the property listings within the scope of the map.
    5. The user shall be able to save a property listing
    6. The user shall be able to save a realtor
17. The user shall be able to search for amenities from the center of the map
    1. The amenities shall be displayed as points on the map
    2. The user shall be able to specify a radius for the search within a set interval
    3. The user shall be able to search for Pools
    4. The user shall be able to search for Gyms
    5. The user shall be able to search for Restaurants
    6. The user shall be able to click on an amenity point
    7. The user shall be able to see the information contained within an amenity point
       1. The amenity point shall contain the name of the venue
       2. The amenity point shall contain the type of venue
    8. The user should be able to search for Parks
    9. The user should be able to search for Bike Paths
    10. The user should be able to distinguish the type of a point visually
18. The user shall be able to filter through the property listing points that are displayed on the map
    1. The user shall be able to filter based upon a price interval
    2. The user shall be able to filter based upon the number of bathrooms
    3. The user shall be able to filter based upon the number of bedrooms
    4. The user shall be able to update the results of the filter by clicking on an update button
    5. Property listing points that meet the filter shall continue to be displayed on the map
    6. Property listing points that do not meet the filter shall not continue to be displayed on the map
    7. Property listing points that meet the filter shall continue to be displayed in the list
    8. Property listing points that do not meet the filter shall not continue to be displayed in the list
19. The property listings shall be generated from fake data to demonstrate basic functionality
20. Population statistics shall be generated from real census data
    1. Census data shall be from Census 2010
    2. Census data shall be from Census 2017 Estimates
21. Amenities shall be generated from real data

## CSCI capability requirements

This paragraph shall be divided into subparagraphs to itemize the requirements associated with each capability of the CSCI. A "capability" is defined as a group of related requirements. The word "capability" may be replaced with "function," "subject," "object," or other term useful for presenting the requirements.

The requirements will be referred to their corresponding numbers in the assignment of CSCI to related requirements.  
  
The (DATA) CSCI will be communicating with the Zillow API, Yelp API, and the Census API. The capability of this CSCI is to get the population and property statistics in a given community using the Census API and the Zillow API respectively and to get a list of amenities within a given radius and location.  
  
The (IMD) CSCI will be displaying the map display on the website to the user. The capability of this CSCI is to display pins on the map where each pin is meant to represent a specific property. The (IMD) CSCI will also be responsible to save specific listings if the user hits the save button on a listing.

The (FORM) CSCI will provide the user a form with questions about what kind of house they are looking for. The capability of this CSCI is to provide the web server with information to do queries with the (DATA) CSCI.

The (WEB) CSCI will host an endpoint for the user to connect and view the website. The capability of this CSCI is to serve HTML to the user, display the (IMD) CSCI.

### (CSCI capability)

This paragraph shall identify a required CSCI capability and shall itemize the requirements associated with the capability. If the capability can be more clearly specified by dividing it into constituent capabilities, the constituent capabilities shall be specified in subparagraphs. The requirements shall specify required behavior of the CSCI and shall include applicable parameters, such as response times, throughput times, other timing constraints, sequencing, accuracy, capacities (how much/how many), priorities, continuous operation requirements, and allowable deviations based on operating conditions. The requirements shall include, as applicable, required behavior under unexpected, unallowed, or "out of bounds" conditions, requirements for error handling, and any provisions to be incorporated into the CSCI to provide continuity of operations in the event of emergencies. Paragraph [3.3.x](#_lnxbz9) of this DID provides a list of topics to be considered when specifying requirements regarding inputs the CSCI must accept and outputs it must produce.

The (DATA) capability will be responsible for the following requirement numbers (3, 7, 8, 9, 13).

The (IMD) capability will be responsible for the following requirement numbers (4, 6, 8, 9, 7, 12).

The (FORM) capability will be responsible for the following requirement numbers (3).

The (WEB) capability will be responsible for the following requirement numbers (1, 2, 12).

## CSCI external interface requirements

This paragraph shall be divided into subparagraphs to specify the requirements, if any, for the CSCI’s external interfaces. This paragraph may reference one or more Interface Requirements Specifications (IRSs) or other documents containing these requirements.

The (WEB) CSCI external interface shall be accessible from port 80.

The (DATA) CSCI external interface shall have access to the internet.

### Interface identification and diagrams

This paragraph shall identify the required external interfaces of the CSCI (that is, relationships with other entities that involve sharing, providing or exchanging data). The identification of each interface shall include a project-unique identifier and shall designate the interfacing entities (systems, configuration items, users, etc.) by name, number, version, and documentation references, as applicable. The identification shall state which entities have fixed interface characteristics (and therefore impose interface requirements on interfacing entities) and which are being developed or modified (thus having interface requirements imposed on them). One or more interface diagrams shall be provided to depict the interfaces.

### (Project-unique identifier of interface)

This paragraph (beginning with 3.3.2) shall identify a CSCI external interface by project-unique identifier, shall briefly identify the interfacing entities, and shall be divided into subparagraphs as needed to state the requirements imposed on the CSCI to achieve the interface. Interface characteristics of the other entities involved in the interface shall be stated as assumptions or as "When [the entity not covered] does this, the CSCI shall...," not as requirements on the other entities. This paragraph may reference other documents (such as data dictionaries, standards for communication protocols, and standards for user interfaces) in place of stating the information here. The requirements shall include the following, as applicable, presented in any order suited to the requirements, and shall note any differences in these characteristics from the point of view of the interfacing entities (such as different expectations about the size, frequency, or other characteristics of data elements):

1. Priority that the CSCI must assign the interface
2. Requirements on the type of interface (such as real-time data transfer, storage-and- retrieval of data, etc.) to be implemented
3. Required characteristics of individual data elements that the CSCI must provide, store, send, access, receive, etc., such as:
   1. Names/identifiers
      1. Project-unique identifier
      2. Non-technical (natural-language) name
      3. Technical name (e.g., variable or field name in code or database)
      4. Abbreviation or synonymous names
   2. Data type (alphanumeric, integer, etc.)
   3. Size and format (such as length and punctuation of a character string)
   4. Units of measurement (such as meters, dollars, nanoseconds)
   5. Range or enumeration of possible values (such as 0-99)
   6. Accuracy (how correct) and precision (number of significant digits)
   7. Priority, timing, frequency, volume, sequencing, and other constraints, such as whether the data element may be updated and whether business rules apply
   8. Sources (setting/sending entities) and recipients (using/receiving entities)
4. Required characteristics of data element assemblies (records, messages, files, arrays, displays, reports, etc.) that the CSCI must provide, store, send, access, receive, etc., such as:
5. Names/identifiers
   * 1. Project-unique identifier
     2. Non-technical (natural language) name
     3. Technical name (e.g., record or data structure name in code or database)
     4. Abbreviations or synonymous names
6. Data elements in the assembly and their structure (number, order, grouping)
7. Medium (such as disk) and structure of data elements/assemblies on the medium
8. Visual and auditory characteristics of displays and other outputs (such as colors, layouts, fonts, icons and other display elements, beeps, lights)
9. Relationships among assemblies, such as sorting/access characteristics
10. Priority, timing, frequency, volume, sequencing, and other constraints, such as whether the assembly may be updated and whether business rules apply
11. Security and privacy constraints
12. Sources (setting/sending entities) and recipients (using/receiving entities)
13. Required characteristics of communication methods that the CSCI must use for the interface, such as:
    1. Project-unique identifier(s)
    2. Communication links/bands/frequencies/media and their characteristics
    3. Message formatting
    4. Flow control (such as sequence numbering and buffer allocation)
    5. Data transfer rate, whether periodic/aperiodic, and interval between transfers
    6. Routing, addressing, and naming conventions
    7. Safety/security/privacy considerations, such as encryption, user authentication, compartmentalization, and auditing
14. Required characteristics of protocols the CSCI must use for the interface, such as:
    1. Project-unique identifier(s)
    2. Priority/layer of the protocol
    3. Packeting, including fragmentation and reassembly, routing, and addressing
    4. Legality checks, error control, and recovery procedures
    5. Synchronization, including connection establishment, maintenance, termination
    6. Status, identification, and any other reporting features
15. Other required characteristics, such as physical compatibility of the interfacing entities (dimensions, tolerances, loads, plug compatibility, etc.), voltages, etc.

The (DATA) CSCI will have an API that will be used to communicate with other CSCI’s.

The (FORM) CSCI and (IMD) CSCI will be making HTTP requests to the API provided by the (DATA) CSCI.

The (IMD) CSCI will be making API calls to the (DATA) CSCI in order to get specific information on real estate.

The (FORM) CSCI will be making API calls to the (DATA) CSCI to send the information provided by the user. The information will be the state, county, and city that the user would like to search for real estate.

## CSCI internal interface requirements

This paragraph shall specify the requirements, if any, imposed on interfaces internal to the CSCI. If all internal interfaces are left to the design, this fact shall be so stated. If such requirements are to be imposed, paragraph [3.3](#_17dp8vu) of this DID provides a list of topics to be considered.

(IMD) CSCI interface requirements.

* Shall Use the (DATA) CSCI to gather house data
* Shall Use the (DATA) CSCI to gather city data for a specific county
* Shall Use the (DATA) CSCI to gather population information
* Shall Use the (DATA) CSCI to gather amenity information.
* Shall use Leaflet JS for the map provider.

(DATA) Interface Requirements

* Shall use the Zillow API to gather city data.
* Shall use the Yelp API to gather amenity data.
* Shall use a CSV file containing census information of counties and cities.
* Shall use computer generated housing information.

(WEB) Interface Requirements

* Shall serve HTML files

(FORM) Interface Requirements

* Shall use an HTML form
* Shall use the API provided by the (DATA) CSCI to get a list of cities in a county

## CSCI internal data requirements

This paragraph shall specify the requirements, if any, imposed on data internal to the CSCI. Included shall be requirements, if any, on databases and data files to be included in the CSCI. If all decisions about internal data are left to the design, this fact shall be so stated. If such requirements are to be imposed, paragraphs [3.3.x.c](#_35nkun2) and [3.3.x.d](#_1ksv4uv) of this DID provide a list of topics to be considered.

(DATA) Data Requirements:

* The internal data of this CSCI will be JSON responses from API’s and a CSV file.

(IMD) Data Requirements:

* Decisions about the internal data is left to design.

(FORM) Data Requirements:

* Decisions about the internal data is left to design.

(WEB) Data Requirements:

* Decisions about the internal data is left to design.

## Computer resource requirements

This paragraph shall be divided into the following subparagraphs.

### Computer hardware requirements

This paragraph shall specify the requirements, if any, regarding computer hardware that must be used by the CSCI. The requirements shall include, as applicable, number of each type of equipment, type, size, capacity, and other required characteristics of processors, memory, input/output devices, auxiliary storage, communications/network equipment, and other required equipment.

### Computer software requirements

The software requirements for running the CNF server:

* Operating System: WIndows, Linux, and Mac OS.
* Shall be connected to the internet.
* Shall allow inbound/outbound connections on port 5000.

The software requirements for viewing the webpage:

* Shall work with Mozilla Firefox

## Software quality factors

The quality factors for the design should include correctness, maintainability, and verifiability. Correctness describes the extent to which the CNF CSCI conforms to its requirements and is determined from the following criteria: completeness, consistency, and/or traceability. Maintainability is determined from the following criteria: consistency, modularity, and self-documentation. The quality factor for the performance category is reliability, which shows if a home can be found. Reliability is determined from the following criteria: accuracy and consistency.

## Qualification provisions

This section shall define a set of qualification methods and shall specify for each requirement in Section [3](#_tyjcwt) the method(s) to be used to ensure that the requirement has been met. A table may be used to present this information, or each requirement in Section [3](#_tyjcwt) may be annotated with the method(s) to be used. Qualification methods may include:

1. Demonstration: The operation of the CSCI, or a part of the CSCI, that relies on observable functional operation not requiring the use of instrumentation, special test equipment, or subsequent analysis.
2. Test: The operation of the CSCI, or a part of the CSCI, using instrumentation or other special test equipment to collect data for later analysis.
3. Analysis: The processing of accumulated data obtained from other qualification methods. Examples are reduction, interpretation, or extrapolation of test results.
4. Inspection: The visual examination of CSCI code, documentation, etc.
5. Special qualification methods: Any special qualification methods for the CSCI, such as special tools, techniques, procedures, facilities, and acceptance limits.

The (DATA) CSCI will be demonstrated by running integration tests that will invoke the (DATA) functions. Testing the (DATA) CSCI will involve checking return values of API calls and validating error checking within the (DATA) CSCI. Inspection for quality of the (DATA) CSCI code and documentation will occur weekly.

The (IMD) CSCI will be demonstrated by the actual usage of the interactive map and unit tests of the map functionality. Testing the (IMD) CSCI will involve visually checking the map for results of the CSCI functionality. Inspection for quality of the (IMD) CSCI code and documentation will occur weekly

The (FORM) CSCI will be demonstrated by the actual usage of the search form and integration tests of the API calls invoked by the search form. Testing the (FORM) CSCI will involve entering invalid input into the search form to ensure errors are handled correctly. Inspection for quality of the (FORM) CSCI code and documentation will occur weekly.

The (WEB) CSCI will be demonstrated by users connecting to the CNF server and viewing the webpage for validity. Testing the (WEB) CSCI will involve unit testing the inner functionality between the webpage and the (DATA) CSCI to validate the logic. Inspection for quality of the (WEB) CSCI will occur weekly.

# Notes

CDP: A place that is not a municipality, but has census data available.

Municipality: A City/Town/Village that has its own government (Elected officials, Mayor, Council, …etc).

Amenity: A venue that could provide goods or service to someone who owns a home near their location

Property Statistics: For the scope of the CNF, this shall be the address, number of bedrooms, number of bathrooms, and price.

Population Statistics: For the scope of the CNF, this shall be population and population density of a given area.

Scope of the Map: The extent of the square map pane of the CNF, specifically the area between the top left latitude and longitude, top right latitude and longitude, bottom left latitude and longitude, and bottom right latitude and longitude.

# Appendixes

Appendixes may be used to provide information published separately for convenience in document maintenance (e.g., charts, classified data). As applicable, each appendix shall be referenced in the main body of the document where the data would normally have been provided. Appendixes may be bound as separate documents for ease in handling. Appendixes shall be lettered alphabetically (A, B, etc.).