Compensation Analysis Tool

Software Requirements Specification

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Contents

1 Introduction

1.1 Purpose

The purpose of this document is to provide a description of the system requirements for the Compensation Analysis Tool software. The document includes details about the domain of the project, a listing of identified functional and non-functional requirements, as well as requirements on the development and maintenance process.

1.2 Overview

The information in this document is presented in the following order:

- The domain of the project is described in §2. This sections provides details about the project objectives, the scope of the project, the involved stakeholders, as well as the constraints, assumptions, and risks that will affect the implementation of the project.
- The functional requirements of the project are listed in §3.
- The non-functional requirements of the project are listed in §4.
- Requirements on the development and maintenance process are given in §5. This includes testing procedures, the implementation order of requirements, and likely changes.

1.3 Definitions, Acronyms, and Abbreviations

FIR:	functional input requirement
FDSR:	functional data structure requirement
FAR:	functional algorithmic requirement
FOR:	functional output requirement
AR:	appearance requirement
SR:	style requirement
EUR:	ease of use requirement
LR:	learning requirement
UPR:	understandability and politeness requirement
ACR:	accessability requirement
SLR:	speed and latency requirement
PAR:	precision and accuracy requirement
RFR:	robustness or fault-tolerance requirement
LONGR:	longevity requirement
EPER:	expected physical environment requirement
MR:	maintenance requirement
MSR:	supportability requirement
MAR:	adaptability requirement
SAR:	access requirement

SPR: privacy requirement

CCR: cultural requirement

LCR: compliance requirement

2 Domain

2.1 Objectives

The objective of this project is to produce a software tool used to assess and rank the most viable locations to start a career in a particular field. The software will produce a list of locations that offer the best income potential for a particular career or field using a mixture of employment and cost of living statistics. In addition, the software will include an option to consider the possibility of commuting in order to reduce the cost of living.

The following datasets will be used to develop the application:

- Occupational employment statistics published by the United States Department of Labor [1] will be used to find location-based average compensation for specific careers
- Location affordability statistics published by the United States Office of the Secretary of Transportation [2] will be used in the assessment of location-based costs of living
- Geographic location data from the GeoNames database [3] will be used to create a graph for computing location/commute distances

2.2 Scope

The application will be geographically limited to the United States and will only consider income related factors to arrive at a ranking. These limitations may be expanded upon in the future, but such enhancements are beyond the current scope of the application. The application will be implemented in Java and will be able to be run on any desktop, laptop, or other device with the ability to execute JAR (Java Archive) files.

2.3 Stakeholders

The stakeholders of this project include the team members, the instructor and teaching assistants of the CAS 2XB3 course, and any persons seeking employment who would use the tool.

2.4 Constraints

The following constraints will apply to the development of our application:

1. The implementation of the application must include at least one sorting algorithm, at least one searching algorithm, and at least one graph-based algorithm.
2. All milestones outlined in the CAS 2XB3 project description must be met.
3. All deliverables must be completed in their final form by the due date given in the CAS 2XB3 project description.

2.5 Assumptions and Dependencies

The following assumptions were made in the development of our requirements:

1. The computer/device used to run the application will have the ability to execute JAR files.

2.6 Risks

The risks that may need to be overcome during the implementation of this project are:

1. Successful integration and utilization of the datasets listed in §2.1 will need to be achieved in order for the application to function properly.
2. Successful teamwork and scheduling will be imperative in meeting all of the deadlines given in the CAS 2XB3 project description.

3 Functional Requirements

3.1 Input Requirements

FIR1. The application must allow the user to select a career field.

Rationale: The user must be able to select a career field in order to perform the analysis.

Fit Criterion: The user is able to select a career field when running an analysis.

FIR2. The application must allow the user to (optionally) select a career title.

Rationale: The user must have the option of selecting a career title to allow for a more specific analysis.

Fit Criterion: The user is able to select a career title when running an analysis.

FIR3. The application must allow the user to (optionally) select a location restriction.

Rationale: The user must have the option to limit analyses within a radius of a particular city.

Fit Criterion: The user is able to select a location and radius when running an analysis to limit the search.

FIR4. The application must allow the user to (optionally) select a commuting distance.

Rationale: The user must have the option to limit analyses within a radius of a particular city.

Fit Criterion: The user is able to select a career field when running an analysis.

FIR5. The application must allow the user to run an analysis after all required/optional inputs are specified.

Rationale: The application must be able to perform analyses.

Fit Criterion: The user is able to run an analysis that transforms input data into output data.

3.2 Data Structure Requirements

FDSR1. The application must load and store employment statistics information using the data available from the U. S. Bureau of Labor Statistics.

Rationale: Employment data is required to perform the analyses.

Fit Criterion: Employment data is successfully loaded/stored into an abstract datatype by the application.

FDSR2. The application must load and store cost of living information using the data available from the U. S. Office of the Secretary of Transportation.

Rationale: Cost of living data is required to perform the analyses.

Fit Criterion: Cost of living data is successfully loaded/stored into an abstract datatype by the application.

FDSR3. The application must load and store geographic location information for U.S. cities using the data available from the GeoNames database.

Rationale: The geographic location data of U.S. cities is required to perform the analyses.

Fit Criterion: Geographic location data is successfully loaded/stored into an abstract datatype by the application.

3.3 Algorithmic Requirements

FAR1. The application must be able to sort employment data efficiently for use in the analyses.

Rationale: Employment data must be sorted to enable efficient searching.

Fit Criterion: The application successfully sorts location data in *n log n* time.

FAR2. The application must be able to search employment data efficiently for use in the analyses.

Rationale: Searching of employment data will be performed frequently by the application.

Fit Criterion: The application searches for an entry in the loaded employment data and returns a result in *log n* time or better.

FAR3. The application must be able to sort cost of living data efficiently for use in the analyses.

Rationale: Cost of living data must be sorted to enable efficient searching.

Fit Criterion: The application successfully sorts cost of living data in *n log n* time.

FAR4. The application must be able to search cost of living data efficiently for use in the analyses.

Rationale: Searching of cost of living data will be performed frequently by the application.

Fit Criterion: The application searches for an entry in the loaded cost of living data and returns a result in *log n* time or better.

FAR5. The application must be able to sort location data efficiently for use in the analyses.

Rationale: Location data must be sorted to enable efficient searching.

Fit Criterion: The application successfully sorts location data in *n log n* time.

FAR6. The application must be able to search location data efficiently for use in the analyses.

Rationale: Searching of location data will be performed frequently by the application.

Fit Criterion: The application searches for an entry in the loaded location data and returns a result in *log n* time or better.

FAR7. The application must be able to transform a set of inputs into a ranked listing of the locations that yield the highest adjusted compensation (the output).

Rationale: This is the main function of the application. This requirement depends on the previous algorithmic requirements for sorting and searching.

Fit Criterion: A given input is successfully transformed into an output consisting of a list of locations ranked by highest adjusted compensation.

3.4 Output Requirements

FOR1. The application must print the output data in a way that is readable by the user.

Rationale: The user needs to be able to see the result of the analysis.

Fit Criterion: Output data is formatted and displayed in the application.

4 Non-Functional Requirements

4.1 Look and Feel Requirements

4.1.1 Appearance Requirements

AR1. The Application should have a default bright and colorful scheme, using uniform colors and a uniform layout.

AR2. All tabs, buttons and input fields must be easily visible.

4.1.2 Style Requirements

SR1. The Application should provide a uniform look and feel between all the pages and tabs.

SR2. Results returned from the input must be clear and uniform.

4.2 Usability and Humanity Requirements

4.2.1 Ease of Use Requirements

EUR1. Searching through career fields, and finding the needed result must be easy and fast to do.

EUR2. Choosing your current location, and accepted radius must be easy to do.

4.2.2 Learning Requirements

LR1. The product should have an intuitive layout, it will take the user no longer than 10 minutes to learn to use.

4.2.3 Understandability and Politeness Requirements

UPR1. Application must use proper English, and must be easy to read.

UPR2. No inappropriate language must be included.

4.2.4 Accessibility Requirements

ACR1. Font sizes, input boxes, and results should all be appropriate size.

4.3 Performance Requirements

4.3.1 Speed and Latency Requirements

SLR1. Load times between the user inputting their information to the program giving the results must take no longer than 10 seconds.

4.3.2 Precision or Accuracy Requirements

PAR1. The application must give appropriate results depending on the exact radius the user requested.

PAR2. Inputted radius must be accurate to 1̃00 meters.

4.3.3 Reliability and Availability Requirements

RAR1. The system shall be available at all times.

4.3.4 Robustness or Fault-Tolerance Requirements

RFR1. The application must give the user a relevant error message when an error occurs.

RFR2. The application must insure the user inputs all necessary fields before searching.

RFR3. The application must save the users previous entries.

4.3.5 Longevity Requirements

LONGR1. The application must run as long as it is on a compatible OS.

4.4 Operational and Environmental Requirements

4.4.1 Expected Physical Environment Requirements

EPER1. The application will be used by users looking for potential employment.

4.5 Maintainability and Support Requirements

4.5.1 Maintenance Requirements

MR1. The system should be documented in such a way that maintaining and updating it is easy for programmers who did not build it initially.

4.5.2 Supportability Requirements

MSR1. The application must run on windows, and be accessible to anyone with a windows computer.

4.5.3 Adaptability Requirements

MAR1. The system should be built in such a way that adding entirely new features does not require the rewriting of old features.

4.6 Security Requirements

4.6.1 Access Requirements

SAR1. The application will be accessible to users with a compatible computer/device.

4.6.2 Privacy Requirements

SPR1. The system shall protect the privacy of users, not allowing users to access others users personal information.

4.7 Cultural and Political Requirements

4.7.1 Cultural Requirements

CCR1. The product will use Canadian English spelling.

4.8 Legal Requirements

4.8.1 Compliance Requirements

LCR1. This product will comply with the Personal Information Protection and Electronic Documents Act.

LCR2. This product will comply with the Ontario Freedom of Information and Privacy Act.

5 Requirements on the Development and Maintenance Process

5.1 Quality Control Procedures

Quality will be controlled by employing both unit testing and manual testing by the developers. Unit testing will be carried out using JUnit and will include tests that ensure the accuracy of all data structures and algorithms implemented in this project. Manual testing will include visual inspections to ensure that input and output fields display correctly and function correctly.

5.2 Implementation of Requirements

The implementation of requirements will be carried out in the following order:

1. Data structure and algorithmic functional requirements will be implemented first and will act as the core of the application.

2. Input and output functional requirements will be implemented next to create a fully working application.

3. Non-functional requirements will be checked for adherence. If some non-functional requirements are not met, small changes to the implementation should be sufficient to remedy them.

5.3 Likely Changes

At this point, there are no likely changes to the functional or non-functional requirements described in this document, or to the development and maintenance process.

References

[1] U.S. Department of Labor, Bureau of Labor Statistics. (2015, Nov 4). *Occupational Employment Statistics - Employment and Wages* [Online]. Available: `http://catalog.data.gov/dataset/occupational-employment-statistics-employment-and-wages`

[2] Office of the Secretary of Transportation. (2015, Aug 28). *Location Affordability Index: All Census Places* [Online]. Available: `http://catalog.data.gov/dataset/location-affordability-index-all-census-places`

[3] GeoNames. (2016, Feb 7). *GeoNames* [Online]. Available: `http://download.geonames.org/export/dump/`