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Abstract

This is the System Requirements Specification for an application that will be used to graph multi-dimensional data in a two-dimensional space.

Multi-Dimensional Graphing Application

S.M.A.R.T.

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# Introduction

## Purpose

This is a Software Requirement Specification (SRS) describing a requested software system prior to implementation. It includes descriptions of the functions and requirements of the software along with analysis of its development.

## Scope

The software that has been requested is a data visualization application built to display multi-dimensional data sets using the Shifted Paired Coordinate and Collocated Paired Coordinate graphing methods. It is being requested by Dr. Boris Kovalerchuk, a professor of Computer Science at Central Washington University (CWU). The software will be developed for the Microsoft Windows operating system. It is expected to be able to take a file in the .csv file format and interpret it into one of the specified graphs. Additionally, the application should be able to display data in the Time Series format.

## Definitions

**customer:** The person(s) who pay for the product and usually (but not necessarily) decide the requirements. In this case, the product is free, and the customer is Dr. Boris Kovalerchuk, a professor of computer science at CWU.

**supplier**: The person, or persons, who produce a product for a customer. In this case, the supplier is the Student Mobile Application Rapid-deployment Team (SMART). This team is made up of five computer-science students: Paul Collet, Julia Carter, Mahlet Seketa, Allyn Vo, and Phillipe Shin. These students are fulfilling the customer’s request as part of their required software engineering project (field experience equivalent).

**SMART**: Student Mobile Application Rapid-deployment Team; the front-end supplier.

**SRS:** Software Requirement Specification

**Windows:** A popular operating system used on a wide range of personal computers.

**stand-alone**: independent; software that does not need to interact with any other software to function.

**multi-dimensional**: A data set containing more than two dimensions

**SPC**: Shifted Paired Coordinate. A system of graphing for multi-dimensional data.

**CPC**: Collocated Paired Coordinate. A system of graphing for multi-dimensional data.

# Proposed System

## Functional Requirements

### System must translate CSV files into graphs

The system must be able to take as input a properly formatted CSV file and interpret it as a series of data points and classes which will be used in the various graphs.

### System must graph data sets in the Collocated Paired Coordinate format

The system must be able to interpret data as a Collocated Paired Coordinate graphj, displaying data points as either separate graphs or as different lines on one single graph.

### System must graph data sets in the Shifted Paired Coordinate format

The system must be able to interpret data as a Shifted Paired Coordinate graph, again displaying data points on separated or combined graphs. Additionally each pair of axes in an SPC graph should be able to be repositioned, with lines and points readjusting to fit the new position.

### System must graph data sets in the Time Series formats

The system must be able to interpret data as Standard Time Series, Difference Time Series, and Time SPC-CPC graphs. Time Series graphs should be properly normalized.

### System must graph data sets in the Continuous Parallel Coordinate formats

The system must be able to interpret data as Continuous Parallel Coordinate and Continuous Parallel Coordinate Difference graphs. Each graph must have proper coloration for legibility.

### System must allow the user to zoom in and out of a graph set

A user of the system should be able to zoom in and out of the viewport in addition to panning the view around.

## Non-Functional Requirements

### Usability

The sytem must have a simple, legible interface with easily readable graphs. The zoom function must enable users testing very large data sets to view the generated graphs with precision.

### Reliability

The system should be able to process large and irregular data sets in any supported format without crashing or major graphical issues.

### Performance

The space requirements of the system should be minimal, as all of the storage is handled by the existing CSV format. The system should make use of the OpenGL library to render large data sets relatively quickly.

### Security

There are no serious security concerns with this application.

### Maintainability

The system should be able to easily be modified and maintained by the customer. The source code will be provided upon delivery of the system. The customer should be able to extend the software to include features not included in the original product.

### Implementation

The system should be built using C++. It will use the Windows Forms and OpenGL libraries due to their flexibility and performance when used for graphing applications.

# Conclusion

These are the final requirements for the project. While there is no current system for this in place to work off of, the mathematical basis for the graphing already exists and as such it is only a matter of implementing the graphing with a functioning GUI.