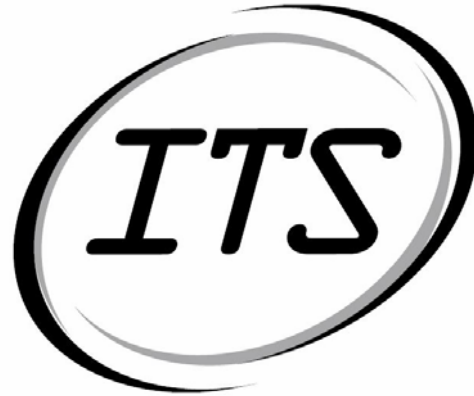**ITS Graphical Report Maker**

Software Requirements Specification

10 February 2004

Team JACT Software
RIT Software Engineering Department

Version 1.3.0

Revision History

Revision	Date	Author	Section	Comments/Changes
0.1.0	26 Jan 2004	A. Buehler	All	Template Creation
1.0.0	29 Jan 2004	All	All	Initial Revision
1.1.0	30 Jan 2004	J. Myers	Functional, Non-Functional, and Prototypes	Ran CaliberRM Update and Formatting Changes
1.2.0	06 Feb 2004	J. Myers	All	Added Formal Model, State Diagram, and Updates throughout
1.3.0	10 Feb 2004	A. Buehler	State diagram, Use Cases	Added references to states and GUI diagrams.

Table of Contents

1   Introduction

1.1 Purpose

The purpose of this document is to specify the requirements for the ITS Graphical Report Maker (GRM). It provides complete and detailed coverage of the GRM requirements which are used for test plan creation. This document acts as an agreement between ITS and the JACT Software Group (JACT) regarding the GRM project requirements. This document does not address design or implementation issues.

1.2 Audience

This Software Requirements Specification is intended to be used by members of the development team that will implement and verify the correct functionality of the GRM. In addition, this document represents the consensus of the development team and the responsible ITS staff members regarding how the GRM will operate.

• Emilio DiLorenzo, ITS, Director of Technical Support Services

• Mark J. Kimble, ITS, System Management and Tools Technical Support Services

• Patrick Saeva, ITS, Program Manager

• Dr. James Vallino, Faculty Advisor

• Dr. Stephanie Ludi, Assistant Faculty Advisor

• Adam Buehler, Development Team

• Cesario Tam, Development Team

• John Myers, Development Team

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1.3 Requirements Process

The requirements herein were elicited largely through interviews, which took place at weekly meetings between the development team and Mark Kimble, the ITS project sponsor. Most requirements were brought in by Mr. Kimble, but some were filled by suggestions made by the development team. Management and storage of the requirements is supported by CaliberRM, a Borland requirements management tool.

2   Overall Description

2.1 Product Description and Scope

RIT ITS Systems Management is responsible for the generation of real time data, historical data, graphs plus reports on the capacity, availability and responsiveness of ITS supported services. This data is used to show ITS systems performance to customers, support staff and RIT leadership to assist in making technical and business related decisions. Currently ITS utilizes many commercial off the shelf (COTS) products to perform these tasks and even though these tools are adequate for technical and engineering staff use, they lack ability to show system wide status and performance in a method deliverable to end-users and management.

2.2 Objectives

• To provide the ITS staff with a new medium to generate graphical reports for upper management review and technical analysis.

• To provide the ITS staff the ability to generate graphical reports using the data from the provided database.

• To allow the ITS staff around-the-clock, online access to all reports that have been prepared in advance.

2.3 Users Descriptions

There will be only one user class for the GRM. This user class will have access to all available functionality, as described fully in this SRS. A member of this class will be limited to those with permission to use the GRM, as given by an LDAP authentication check.

2.4 Operational Environment

Two general requirements exist for the Graphical Report Maker System. First, the GRM shall operate on a computer that is running Unix and has MySQL installed. Secondly, the GRM shall use commonly used browsers as the interactive interface. More detailed requirements regarding these interactions are described in Section 5: Non-Functional Requirements under "External System."

3 Functional Requirements

3.1 - UserAuthentication
Requirement Version 1.4.0
Priority: High
Description: The system shall require users to be logged into the system in order to use its functionality.

3.1.1 - UserLogsIn
Requirement Version 1.6.0
Priority: High
Description: The system shall require the user to log in.

3.1.1.1 - UserLogsInUsername
Requirement Version 1.3.0
Priority: High
Description: The system shall require the user to provide a username.

3.1.1.2 - UserLogsInPassword
Requirement Version 1.2.0
Priority: High
Description: The system shall require the user to provide a password.

3.1.1.3 - UserLogsInLDAPAuthentication
Requirement Version 1.1.5
Priority: High
Description: The system shall verify the username and password using ITS LDAP Authentication.

3.1.2 - UserLogsOut
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to log out of the system.

3.1.2.1 - UserLogsOutExitProgram
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to log out of the system from any point within the system by exiting the program.

3.1.2.2 - UserLogsOutOption
Requirement Version 1.2.5
Priority: High
Description: The system shall allow the user to log out of the system by indicating the log out option.

3.1.2.3 - UserLogsOutConfirmDiscard
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to discard an unsaved Element on log out.

3.1.2.4 - UserLogsOutConfirmSave
Requirement Version 1.3.0

Priority: High
Description: The system shall allow the user to save an unsaved Element on log out.

3.2 - Element
Requirement Version 1.10.1
Priority: High
Description: The system shall allow the user to define the attributes values for an Element.

3.2.1 - CreateElement
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to create a new Element.

3.2.1.1 - CreateElementCancel
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to cancel all actions from within the creation state.

3.2.1.1.1 - CreateElementCancelDiscard
Requirement Version 1.4.0
Priority: High
Description: The system shall discard all information that was entered on cancellation.

3.2.1.2 - CreateElementInsert
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to insert an existing Element into the new Element.

3.2.1.2.1 - CreateElementInsertSaved
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to insert a user defined Element.

3.2.1.2.2 - CreateElementInsertBase
Requirement Version 1.9.0
Priority: High
Description: The system shall allow the user to insert a base Element with user assigned attribute values.

3.2.1.2.2.1 - CreateElementInsertBaseSelect
Requirement Version 1.8.0
Priority: High

Description: The system shall allow the user to select the type of the base Element.

3.2.1.2.2.2 - CreateElementInsertBaseAttributes
Requirement Version 1.6.0
Priority: High
Description: The system shall allow the user to assign attribute values to the chosen base Element.

3.2.1.3 - CreateElementVerification
Requirement Version 1.3.0
Priority: High
Description: The system shall be able to verify that the attribute values of the new Element are valid.

3.2.2 - ModifyElement
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to modify existing Element's attribute values.

3.2.2.1 - ModifyElementSelect
Requirement Version 1.7.0
Priority: High
Description: The system shall allow the user to select an Element to be modified.

3.2.2.2 - ModifyElementAttributes
Requirement Version 1.8.0
Priority: High
Description: The system shall allow the user to modify the attribute values of an Element.

3.2.2.3 - ModifyElementVerfication
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to verify the new attribute values of the modified Element.

3.2.2.4 - ModifyElementCancel
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to cancel the modification.

3.2.2.4.1 - ModifyElementCancelRevert
Requirement Version 1.3.0
Priority: High

Description: The system shall revert all modified attribute values to their previous states on cancellation.

3.2.3 - PreviewElement
Requirement Version 1.6.0
Priority: High
Description: The system shall allow the user to preview an Element before saving it.

3.2.3.1 - PreviewElementSelect
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to preview an Element after certain conditions.

3.2.3.1.1 - PreviewElementSelectPostCreation
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to preview the Element after creation.

3.2.3.1.2 - PreviewElementSelectPostModification
Requirement Version 1.1.1
Priority: High
Description: The system shall allow user to preview the Element after modification.

3.2.3.2 - PreviewElementInput
Requirement Version 1.2.6
Priority: High
Description: The system shall provide input for the preview based on the attributes of the Element.

3.2.3.3 - PreviewElementOutput
Requirement Version 1.4.0
Priority: High
Description: The system shall be able to generate a preview based on the output attributes of the Element.

3.2.3.3.1 - PreviewElementOutputNotDefined
Requirement Version 1.4.5
Priority: High
Description: The system shall generate a preview based on a tabular form for any Element that does not have defined output attributes.

3.2.3.4 - PreviewElementSave
Requirement Version 1.2.0
Priority: High

Description: The system shall allow the user to save the Element being previewed.

3.2.4 - ElementType
Requirement Version 1.3.6
Priority: High
Description: The system shall have different types of predefined base Elements.

3.2.4.1 - ElementTypeRover
Requirement Version 1.4.0
Priority: High
Description: The system shall define the Element type Rover as an Element with no inputs and one or more outputs. A Rover Element retrieves data.

3.2.4.1.1 - ElementTypeRoverDatabaseExtractor
Requirement Version 1.1.5
Priority: High
Description: The system shall have an Element of type Rover that extracts data from an external database.

3.2.4.2 - ElementTypeOperation
Requirement Version 1.4.5
Priority: High
Description: The system shall define the Element type Operation as an Element with one or more inputs and one or more outputs. An Operation Element manipulates data.

3.2.4.2.1 - ElementTypeOperationAdd
Requirement Version 1.6.0
Priority: High
Description: The system shall have an Add Operation Element that takes two or more inputs and produces an output that represents the sum of the inputs.

3.2.4.2.2 - ElementTypeOperationMean
Requirement Version 1.6.0
Priority: High
Description: The system shall have a Mean Operation Element that takes two or more inputs and produces an output that represents the mean of the inputs.

3.2.4.2.3 - ElementTypeOperationMedian
Requirement Version 1.5.0
Priority: High
Description: The system shall have a Median Operation Element that takes two or more inputs and produces an output that represents the median of the inputs.

3.2.4.2.4 - ElementTypeOperationMode

Requirement Version 1.5.0
Priority: High
Description: The system shall have a Mode Operation Element that takes two or more inputs and produces an output that represents the mode of the inputs.

3.2.4.2.5 - ElementTypeOperation25Percentile
Requirement Version 1.5.0
Priority: High
Description: The system shall have a 25Percentile Operation Element that takes two or more inputs and produces an output that represents the 25 Percentile of the inputs.

3.2.4.2.6 - ElementTypeOperation75Percentile
Requirement Version 1.5.0
Priority: High
Description: The system shall have a 75Percentile Operation Element that takes two or more inputs and produces an output that represents the 75 Percentile of the inputs.

3.2.4.2.7 - ElementTypeOperationRange
Requirement Version 1.4.0
Priority: High
Description: The system shall have a Range Operation Element that takes two or more inputs and produces an output that represents the range of the inputs.

3.2.4.2.8 - ElementTypeOperationInterquartialRange
Requirement Version 1.5.0
Priority: High
Description: The system shall have an InterquartileRange Operation Element that takes two or more inputs and produces an output that represents the interquartile range of the inputs.

3.2.4.2.9 - ElementTypeOperationVariance
Requirement Version 1.5.0
Priority: High
Description: The system shall have a Variance Operation Element that takes two or more inputs and produces an output that represents the variance of the inputs.

3.2.4.2.10 - ElementTypeOperationStandardDeviation
Requirement Version 1.4.0
Priority: High
Description: The system shall have a StandardDeviation Operation Element that takes two or more inputs and produces an output that represents the standard deviation of the inputs.

3.2.4.2.11 - ElementTypeOperationTimeFilter

Requirement Version 1.4.0
Priority: High
Description: The system shall have a TimeFilter Operation Element that takes two or more inputs and produces an output where data points are snapped into discrete time points.

3.2.4.2.12 - ElementTypeOperationTimeCorrelator
Requirement Version 1.4.0
Priority: High
Description: The system shall have a TimeCorrelator Operation Element that takes two or more inputs and produces an output that represents a correlation of the inputs.

3.2.4.2.13 - ElementTypeOperationSubtract
Requirement Version 1.5.0
Priority: High
Description: The system shall have a Subtract Operation Element that takes two inputs and produces an output that represents the difference of the inputs.

3.2.4.2.14 - ElementTypeOperationMultiply
Requirement Version 1.4.0
Priority: High
Description: The system shall have a Multiply Operation Element that takes two or more inputs and produces an output that represents the product of the inputs.

3.2.4.2.15 - ElementTypeOperationDivide
Requirement Version 1.5.0
Priority: High
Description: The system shall have a Divide Operation Element that takes two inputs and produces an output that represents the division of the inputs.

3.2.4.2.15.1 - ElementTypeOperationDivideError
Requirement Version 1.1.0
Priority: High
Description: The system shall be able to detect if the division is violating the division by zero law.

3.2.4.2.16 - ElementTypeOperationConstant
Requirement Version 1.3.0
Priority: High
Description: The system shall have an element of type operation that takes no input and produces an output of a constant number as set by its attributes.

3.2.4.2.17 - ElementTypeOperationApplication
Requirement Version 1.2.2
Priority: High

Description: The system shall allow the user to specify the way in which the Operation is applied across the given data sets.

3.2.4.2.17.1 - ElementTypeOperationApplicationSingle
Requirement Version 1.1.0
Priority: High
Description: The system shall allow the user to apply the Operation across a single data set using the values within the set.

3.2.4.2.17.2 - ElementTypeOperationApplicationMultiple
Requirement Version 1.2.0
Priority: High
Description: The system shall allow the user to apply the Operation across multiple data sets correlating values by time stamp.

3.2.4.3 - ElementTypeGenerator
Requirement Version 1.4.0
Priority: High
Description: The system shall define the Element type Generator as an Element with one or more inputs and no outputs. A Generator Element generates Reports.

3.2.4.3.1 - ElementTypeGeneratorGraphical
Requirement Version 1.3.0
Priority: High
Description: The system shall have an Element of type Graph Generator that generates a graphical report.

3.2.4.3.2 - ElementTypeGeneratorTabular
Requirement Version 1.2.0
Priority: High
Description: The system shall have an Element of type Tabular Generator that generates a tabular report.

3.2.4.4 - ElementTypeReport
Requirement Version 1.4.0
Priority: High
Description: The system shall define the Element type Report as an executable Element with no inputs and no outputs.

3.2.4.4.1 - ElementTypeReportGraphical
Requirement Version 1.2.0
Priority: High
Description: The system shall have an Element of type Report that contains a graphical Generator.

3.2.4.4.2 - ElementTypeReportTabular
Requirement Version 1.2.0

Priority: High
Description: The system shall have an Element of type Report that contains a tabular Generator.

3.3 - ElementPersistency
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to manage the persistency of Elements. This includes the ability to save Elements as their subtypes (Rover, Generator, Operation, or Report) as well as the ability to delete any Elements that currently exist within the system.

3.3.1 - SaveElement
Requirement Version 1.8.0
Priority: High
Description: The system shall allow the user to save Elements into a persistent state according to their Element Type.

3.3.1.1 - SaveElementName
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to assign a unique name to each Element when it is saved.

3.3.1.1.1 - SaveElementNameNotUnique
Requirement Version 1.5.0
Priority: High
Description: The system shall notify the user that the name for the Element is not unique.

3.3.1.1.1.1 - SaveElementNameNotUniqueOverwrite
Requirement Version 1.3.0
Priority: High
Description: The system shall allow allow the user to overwrite the existing Element with another Element with the same name.

####### 3.3.1.1.1.1.1 - SaveElementNameNotUniqueConfirm
Requirement Version 1.2.0
Priority: High
Description: The system shall prompt the user for confirmation before overwriting Elements.

######## 3.3.1.1.1.1.1.1 - SaveElementNameNotUniqueConfirmAccept
Requirement Version 1.2.0
Priority: High
Description: The system shall overwrite the indicated Element upon the confirmation being accepted.

3.3.1.1.1.1.1.2 - SaveElementNameNotUniqueConfirmDeny
Requirement Version 1.2.0
Priority: High
Description: The system shall prompt the user to reenter the name of the Element to be saved upon the confirmation being denied.

3.3.1.1.1.2 - SaveRoverNameNotUniqueRename
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to rename an Element after finding that its name was not unique.

3.3.2 - DeleteElement
Requirement Version 1.4.1
Priority: High
Description: The system shall allow the user to remove from the system of any existing Elements.

3.3.2.1 - DeleteElementName
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to input the name of the Element to be deleted.

3.3.2.1.1 - DeleteElementNameInvalid
Requirement Version 1.2.6
Priority: High
Description: The system shall notify the user if the name entered for deletion does not correspond to an existing Element.

3.3.2.1.1.1 - DeleteElementNameInvalidReentry
Requirement Version 1.2.0
Priority: High
Description: The system shall allow the user to reenter the name of an Element after the given one has been deemed invalid.

3.3.2.2 - DeleteElementConfirm
Requirement Version 1.2.9
Priority: High
Description: The system shall prompt the user to confirm all deletions of Elements.

3.3.2.2.1 - DeleteElementConfirmAccept
Requirement Version 1.2.6
Priority: High

Description: The system shall delete the indicated Element upon the confirmation being accepted.

3.3.2.2.2 - DeleteElementConfirmDeny
Requirement Version 1.2.0
Priority: High
Description: The system shall allow the user to reenter the name of the Element to be deleted upon the confirmation being denied.

3.4 - ReportGeneration
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to access Report Elements.

3.4.1 - ExecuteReport
Requirement Version 1.7.0
Priority: High
Description: The system shall allow the user to execute an existing Report.

3.4.1.1 - ExecuteReportGraphical
Requirement Version 1.6.0
Priority: High
Description: The system shall generate a graphical report upon successful execution of a Graphical Report.

3.4.1.2 - ExecuteReportTabular
Requirement Version 1.6.0
Priority: High
Description: The system shall generate a tabular report upon successful execution of a Tabular Report.

3.4.2 - ExportReportData
Requirement Version 1.8.0
Priority: High
Description: The system shall allow the user to export generated report data into a specified format.

3.4.2.1 - ExportReportDataName
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to assign a unique name to the report data when it is being exported.

3.4.2.1.1 - ExportReportDataNameNotUnique
Requirement Version 1.2.14
Priority: High

Description: The system shall notify the user if the name selected for the report data is not unique.

3.4.2.1.1.1 - ExportReportDataNameNotUniqueOverwrite
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to overwrite the existing report data by the new report data that shares the same name.

3.4.2.1.1.2 - ExportReportDataNameNotUniqueRename
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to rename the report data after finding that its name was not unique.

3.4.2.2 - ExportReportDataGraphical
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to export the generated Graphical Report into different external file format.

3.4.2.2.1 - ExportReportDataJPG
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to export generated report data into a joint photographic group (JPG) file.

3.4.2.2.2 - ExportReportDataGIF
Requirement Version 1.5.0
Priority: High
Description: The system shall allow the user to export generated report data into a general image file (GIF).

3.4.2.2.3 - ExportReportDataPNG
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to export generated report data into a portable network graphic (PNG) file.

3.4.2.3 - ExportReportDataTabular
Requirement Version 1.4.0
Priority: High
Description: The system shall allow the user to export the generated Tabular Report into different external file formats.

3.4.2.3.1 - ExportReportDataCSV
Requirement Version 1.5.0

Priority: High
Description: The system shall the user to export generated report data into a comma separated value (CSV) file.

3.4.2.3.2 - ExportReportDataXML
Requirement Version 1.5.0
Priority: High
Description: The system shall the user to export generated report data into an extensible markup language (XML) file.

3.4.2.3.3 - ExportReportDataHTML
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to export generated report data into a hyper text markup language (HTML) file.

3.4.2.4 - ExportReportDataSelect
Requirement Version 1.2.0
Priority: High
Description: The system shall allow the user to select the file format for the exportation of the generated report data.

4   Non-Functional Requirements

4.1 - External System
Requirement Version 1.3.0
Priority: High
Description: The system shall interact with external systems.

4.1.1 - UserAuthentication
Requirement Version 1.3.1
Priority: High
Description: The system shall use an external LDAP System to authenticate users logging into the GRM System.

4.1.2 - Database
Requirement Version 1.2.2
Priority: High
Description: The system shall extract raw data from an external database for use in generating a report.

4.1.2.1 - SystemType
Requirement Version 1.1.2
Priority: High
Description: The system shall interact with a database running mySQL.

4.1.2.2 - Schema
Requirement Version 1.1.2
Priority: High
Description: The system shall interact with the currently existing schema as created by ITS.

4.1.3 - Script
Requirement Version 1.3.2
Priority: High
Description: The system shall provide a scriptable interface.

4.1.3.1 - Interface
Requirement Version 1.3.2
Priority: High
Description: The system shall provide a console interface that a running script may utilize to execute GRM System commands.

4.1.3.2 - Commands
Requirement Version 1.2.4
Priority: High
Description: The system shall allow specified commands to be executed from the console interface.

4.1.3.2.1 - ExecuteReport
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to execute predefined reports.

4.1.3.2.2 - ExportReportData
Requirement Version 1.3.0
Priority: High
Description: The system shall allow the user to export report data.

4.2 - Maintainability
Requirement Version 1.2.2
Priority: High
Description: The system shall be designed to allow for ease of maintenance.

4.2.1 - Documentation
Requirement Version 1.2.6
Priority: High
Description: The system shall have sufficient documentation.

4.2.1.1 - Code
Requirement Version 1.1.2
Priority: High
Description: The system code shall be documented according to the "Code Conventions for the Java Programming Language" available at http://java.sun.com/docs/codeconv/.

4.2.1.2 - Design Document
Requirement Version 1.1.2
Priority: High
Description: The system shall be described by a "Design Document."

4.2.1.3 - Operations Manual
Requirement Version 1.1.2
Priority: High
Description: The system shall be accompanied by an "Operations Manual" describing proper use of the system.

4.2.1.4 - Deployment Plan
Requirement Version 1.1.2
Priority: High
Description: The system shall be deployed using operations described in the "Deployment Plan."

4.2.2 - Design Considerations
Requirement Version 1.2.2
Priority: High
Description: The system shall be designed with consideration given to maintainability.

4.2.3 - Dynamic Database Connectivity
Requirement Version 1.2.2
Priority: High
Description: The system shall be able to connect to a database that has been configured externally from the system.

4.3 - Performance
Requirement Version 1.2.3
Priority: High
Description: The system shall be designed to perform to the specified standards.

4.3.1 - Graphical User Interface Response Time
Requirement Version 1.3.2
Priority: High
Description: The system shall present the Graphical User Interface for the next operation within 10 seconds of the user requesting it.

4.3.2 - Console User Interface Response Time
Requirement Version 1.3.2
Priority: High
Description: The system shall present the Command Prompt for the next operation within 500 ms following execution and completion of the previous operation.

4.4 - Availability
Requirement Version 1.3.3
Priority: High
Description: The system shall be available for use as described by the specifications.

4.4.1 - Automatic Error Resolution
Requirement Version 1.2.2
Priority: High
Description: The system shall detect and resolve errors that do not require human intervention to do so.

4.5 - Extensibility
Requirement Version 1.2.2
Priority: High
Description: The system shall be designed with consideration given to ease of functionality upgrade.

4.5.1 - Graph Types
Requirement Version 1.2.2
Priority: High
Description: The system shall allow for the implementation of additional types of graphs with no modification to the system's architecture.

4.5.2 - Statistics
Requirement Version 1.3.0
Priority: High
Description: The system shall allow for the dynamic addition of statistic types (Elements of type Operation) through the separate implementation of these types.

4.5.3 - Elements
Requirement Version 1.3.0
Priority: High
Description: The system shall allow for the implementation of additional types of Elements without having to redesign the architecture.

4.6 - Usability
Requirement Version 1.2.2
Priority: High
Description: The system shall provide interfaces that stress ease of use and to minimize likelihood of human error.

4.6.1 - GUI Interface
Requirement Version 1.4.0
Priority: High
Description: The system shall provide a Graphical User Interface that is visually appealing to the user while also ensuring ease of use, accessibility of functionality, minimization of human error and intuitive options.

4.6.2 - CUI Interface
Requirement Version 1.4.0
Priority: High
Description: The system shall provide a Console User Interface that provides basic functionality.

5   Models

5.1 Finite-State Diagram

The finite-state diagram shows the states Login, Main, Creation, Modification, Preview, Save, Execution, View Report Data, Export, and Deletion, connected by numbered transitions 1 through 17.
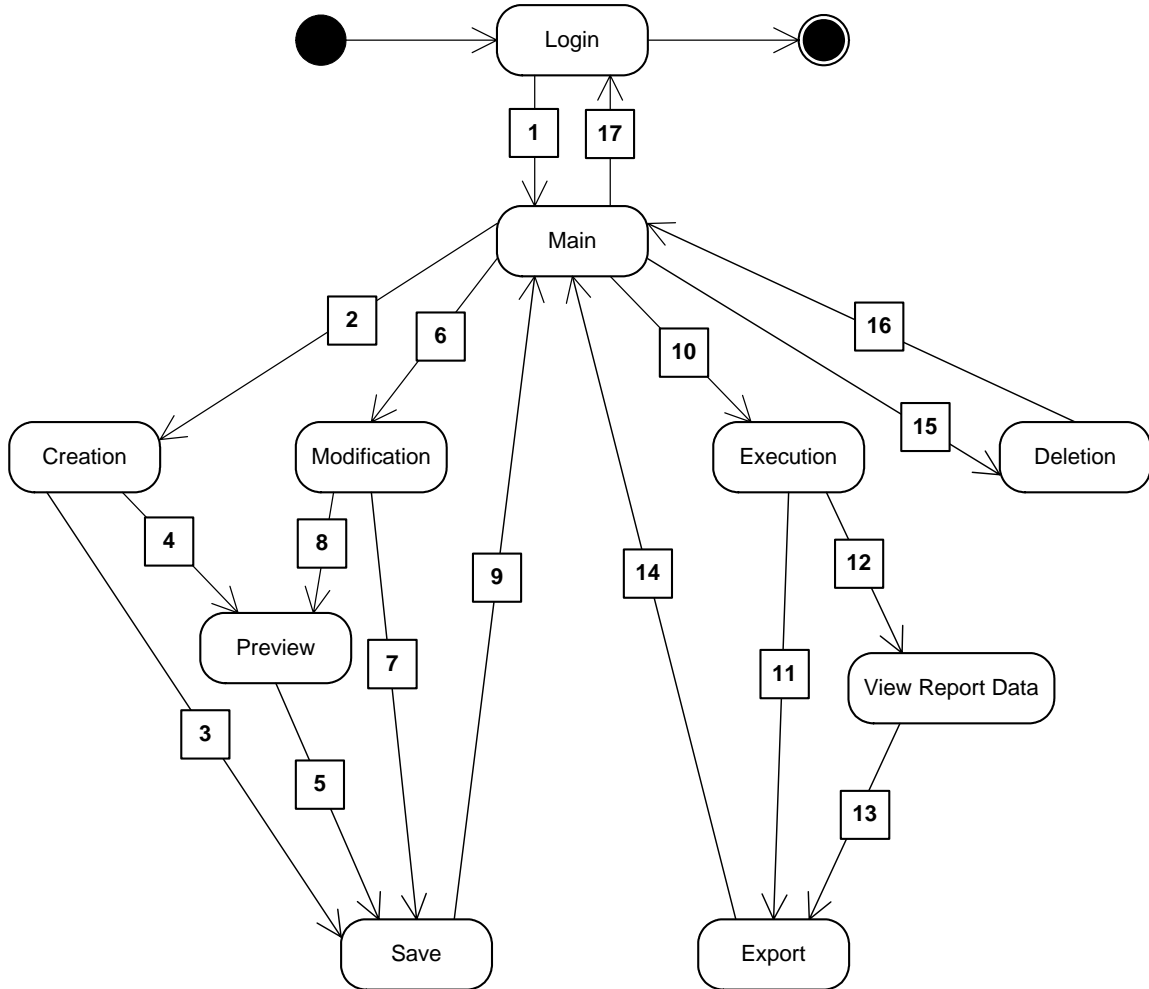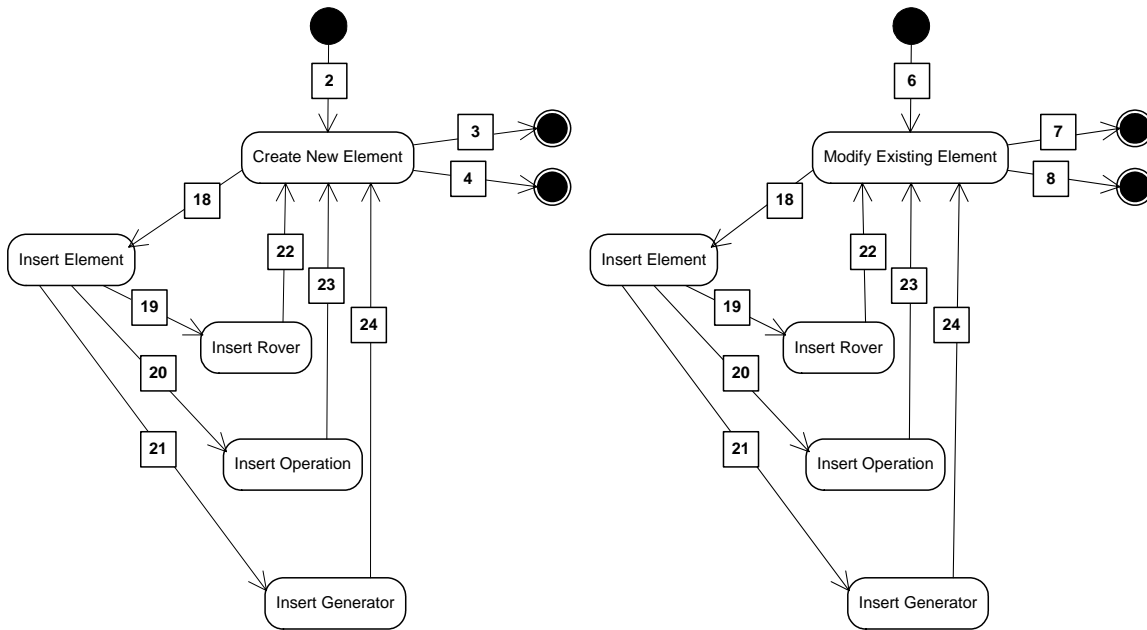
Num	Transition	Input/System Action/Output
1	Login → Main	"Login" Selection/User Authenticated/Display "Main Menu" screen (Figure 2)
2	Main → Creation	"Create New Element" Selection/Display "Create New Element" screen (Figure 3)
3	Creation → Save	"Save" Selection/Display "Save Element" screen (Figure 9)
4	Creation → Preview	"Preview" Selection/Generate Preview/Display "Preview Element" screen (Figure 11)
5	Preview → Save	"Save" Selection/Display "Save Element" screen (Figure 9)
6	Main → Modification	"Modify Existing Element" Selection/Display "Modify Existing Element" screen (Figure 8)
7	Modification → Save	"Save" Selection/Display "Save Element" screen (Figure 9)
8	Modification → Preview	"Preview" Selection/Generate Preview/Display "Preview Element" screen (Figure 11)
9	Save → Main	"Save Element" Selection/Save Element/Display "Main Menu" screen (Figure 1)
10	Main → Execution	"Execute Report" Selection/Display "Execute Report" screen (Figure 13)
11	Execution → Export	"Execute" Selection/Execute Report/Display "Export Report Data" screen (Figure 14)
12	Execution → View Report Data	"Execute" Selection/Execute Report/Display "Report Data" screen (Figure 11)
13	View Report Data →	"Export Report Data" Selection/Display "Export

		Export	Report Data" screen (Figure14)
14	Export → Main		"Export" Selection/Export Report Data/Display "Main Menu" screen (Figure 2)
15	Main → Deletion		"Delete Existing Element" Selection/Display "Delete Existing Element" screen(Figure 12)
16	Deletion → Main		"Delete" Selection/Delete Selected Elements/Display "Main Menu" screen (Figure 2)
17	Main → Login		"Logout" Selection/User Logged Out/Display "Login" screen (Figure 1)
18	Create New Element → Insert Element		"Insert Element" Selection/Display "Insert Element" screen (Figure 4)
19	Insert Element → Insert Rover		"New Rover" Selection/Display "Insert Rover" screen (Figure 5)
20	Insert Element → Insert Operation		"New Operation" Selection/Display "Insert Operation" screen (Figure 6)
21	Insert Element → Insert Generator		"Insert Generator" Selection/Display "Insert Generator" screen (Figure 6)
22	Insert Rover → Create New Element		"Insert" Selection/Display "Create New Element" screen (Figure 3)
23	Insert Operation → Create New Element		"Insert" Selection/Display "Create New Element" screen (Figure 3)
24	Insert Generator → Create New Element		"Insert" Selection/Display "Create New Element" screen (Figure 3)

5.2 Formal Model of Grammar

Capital Letters are Non-Terminals, Lower-Case Letters are Terminals

Report :: Rover | Operation | Generator

Rover :: Rover | Operation
Rover :: database_query(λ) -> data

Generator :: Operation | Generator -> λ
Generator :: graph(data-1, data-2, ..., data-n) -> λ
Generator :: table(data-1, data-2, ..., data-n) -> λ

Operation :: Operation | Operation
Operation :: λ

Operation :: add(data-1, data-2, ..., data-n) -> data
Operation :: subtract(data-1, data-2) -> data
Operation :: multiply(data-1, data-2, ..., data-n) -> data

Operation :: divide(data-1, data-2) -> data

Operation :: time_correlator(data-1, data-2, ..., data-n) -> data
Operation :: time_filter(data-1) -> data

Operation :: mean(data-1, data-2, ..., data-n) -> data
Operation :: median(data-1, data-2, ..., data-n) -> data
Operation :: mode(data-1, data-2, ..., data-n) -> data
Operation :: 25percentile(data-1, data-2, ..., data-n) -> data
Operation :: 75percentile(data-1, data-2, ..., data-n) -> data
Operation :: range(data-1, data-2, ..., data-n) -> data-1, data-2
Operation :: iqr(data-1, data-2, ..., data-n) -> data
Operation :: variance(data-1, data-2, ..., data-n) -> data
Operation :: std_dev(data-1, data-2, ..., data-n) -> data

6   Use Cases

Use Case ID: UC-1

Use Case Name: User Logs In

Primary Actor: GRM User.

Goal: Log into the system.

Pre-Conditions: 1. System is in Login state.

Post-Conditions: 1. System is in Main state

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects to log into the system.	2	System prompts user for username and password.
3	User enters valid username and password.	4	System authenticates username and password.
		5	System redirects user to main interface.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
3	User enters invalid username and password.	4	System authenticates username and password.
		5	System notifies user of invalid username or password. Return to step 2.

UC GUIs: Login Screen, Main Screen

Exceptions:

<u>User Cancellation</u>: When available, the user may select the "Cancel" option. In this event, the system returns to a pre-login state.

Use Cases Utilized: None.

Notes and Issues: None.

Use Case ID: UC-2

Use Case Name: User Logs Out

Primary Actor: GRM User

Goal: Log out of the system.

Pre-Conditions: 1. System is not in the Login state.

Post-Conditions: 1. System is in Login state.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects to logout of the system.	2	System logs user out.
		3	System redirects user to login interface.

UC GUIs: TBD

Exceptions: None.

Use Cases Utilized: None.

Notes and Issues: None.

Use Case ID: UC-3

Use Case Name: Create Element

Primary Actor: GRM User

Goal: To create a new Element.

Pre-Conditions: 1. System is in Main state.

Post-Conditions: 1. System is in Creation state
2. Element attribute values have been accepted

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Create New Element" option.	2	System indicates "Create New Element" option selection.
3	User specifies Element attribute values.		
4	User indicates attributes are set to desired values.	5	System indicates acceptance of attribute values.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
4	User indicates attributes are set to desired values.	5	System indicates one or more attribute values are incorrect.
6	User acknowledges system indication.	7	System returns to step 3.

UC GUIs: Main Screen, Create New Element Screen, Cancel Screen

Exceptions:
User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1

Notes and Issues: None.

Use Case ID: UC-4

Use Case Name: Modify Elements

Primary Actor: GRM User

Goal: To create a new Element.

Pre-Conditions: 1. System is in Main state.

Post-Conditions: 1. System is in Modification state.
                              2. Element attribute values have been accepted.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Modify Element" option.	2	System indicates "Modify Element" option selection.
3	User selects the desired Element to be modified.	4	System indicates selection.
5	User specifies new Element attribute values.		
6	User indicates attributes are set to desired values.	7	System indicates acceptance of attribute values.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
5	User indicates attributes are set to desired values.	6	System indicates attribute values incorrect.
7	User acknowledges system indication.	8	System returns to step 3.

UC GUIs: Main Screen, Modify Element Screen, Cancel Screen

Exceptions:
> User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1

Notes and Issues: None.

Use Case ID: UC-5

Use Case Name: Preview Element

Primary Actor: GRM User

Goal: To preview an Element.

Pre-Conditions: 1. System is in Creation or Modification state.

Post-Conditions: 1. System is in Preview state.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects the "Preview Element" option.	2	System determines appropriate input and output for the preview.
		3	System generates Element preview.
4	User exits preview.	5	System returns to the state previous to the preview selection

Alternate Scenario:

Step	Actor Action	Step	System Reaction
4	User selects the "Save" option.	5	System proceeds to UC-6.

UC GUIs: Create Element Screen, Modify Element Screen, Preview Element Screen

Exceptions:
> User Cancellation: When available, user may select the "Cancel" option. In this event, all information changes are discarded and Query Template Menu is displayed.

Use Cases Utilized: UC-1, UC-3, UC-4

Notes and Issues: None.

Use Case ID: UC-6

Use Case Name: Save Element

Primary Actor: GRM User

Goal: To save the current Element attribute values to a persistent state.

Pre-Conditions: 1. System is in Creation, Modification, or Preview state.
2. System has accepted Element attribute values.

Post-Conditions: 1. System is in Main state.
2. System has saved the Element.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Save Element" option.	2	System determines the type of the Element.
		3	System prompts for name of the Element.
4	User enters unique name of the Element.	5	System saves the Element.
		6	System redirects user to main interface.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
4	User enters non-unique name of the Element.	5	System indicates name is non-unique.
		6	System prompts user to overwrite the existing Element.
7	User selects to overwrite the existing Element.	8	System saves the Element.
		9	System redirects user to main interface.

Step	Actor Action	Step	System Reaction
4	User enters non-unique name of the Element.	5	System indicates name is non-unique.
		6	System prompts user to overwrite the existing Element.
7	User selects to not overwrite the existing Element.	8	System indicates to not overwrite the existing Element. Return to step 3.

UC GUIs: Save Element Screen, Create Element Screen, Modify Element Screen, Cancel Screen

Exceptions:
User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1, UC-3, UC-4

Notes and Issues: None.

Use Case ID: UC-7

Use Case Name: Delete Element

Primary Actor: GRM User

Goal: To remove an existing Element from the system.

Pre-Conditions: 1. System is in Main State.
2. Element exists.

Post-Conditions: 1. System is in Main state.
2. Desired Element is removed from the system

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Delete Element" option.	2	System prompts for Element name.
3	User enters valid Element name.	4	System prompts for conformation of deletion.
5	User confirms deletion.	6	System removes Element.
		7	System redirects user to main interface.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
3	User enters invalid Element name.	4	System indicates that the Element name is in valid.
		5	System returns to Step 2.

Step	Actor Action	Step	System Reaction
5	User does not confirm deletion.	6	System returns to Step 2.

UC GUIs: Delete Element Screen

Exceptions:
User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1

Notes and Issues: None.

Use Case ID: UC-8

Use Case Name: Execute Report

Primary Actor: GRM User

Goal: To produce a report.

Pre-Conditions: 1. System is in Main state.
2. Executable Report exists.

Post-Conditions: 1. System is in View Report Data or Export state.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Execute Report" option.	2	System prompts for name of Report to execute.
3	User enters valid Report name.	4	System executes the Report.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
3	User enters invalid Report name.	4	System indicates that the Report is invalid.
5	User acknowledges system indication.	6	System returns to step 2.

UC GUIs: Execute Report Screen

Exceptions:
User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1

Notes and Issues: None.

Use Case ID: UC-9

Use Case Name: Export Report Data

Primary Actor: GRM User

Goal: To place report data in an external file.

Pre-Conditions: 1. System is in Execution or View Report Data state.

Post-Conditions: 1. System is in Main state.
　　　　　　　　　　2. Report data has been saved to an external file.

Main Scenario:

Step	Actor Action	Step	System Reaction
1	User selects "Export Data" option.	2	System prompts for file name and format to save under.
3	User enters valid file name and format.	4	System exports data.

Alternate Scenario:

Step	Actor Action	Step	System Reaction
3	User enters invalid file name or format	4	System indicates invalid selection. Returns to Step 2.

UC GUIs: Execute Report Screen, Export Report Data Screen

Exceptions:
　　　　User Cancellation: When available, the user may select the "Cancel" option. In this event, all information changes are discarded and the system is returned to main interface.

Use Cases Utilized: UC-1, UC-11

Notes and Issues: None.

7   GUI Prototypes

Figure 1: User Login

Figure 2: Main Menu

Create New Element

```
┌─────────────┐  ┌──────────┐
│   Rover     │  │   Time   │
│Representation│ │  Filter  │
└─────────────┘  └──────────┘
                              ┌─────────┐
┌─────────────┐               │ Average │
│   Rover     │               └─────────┘
│Representation│                          ┌──────────┐
└─────────────┘                           │   Time   │      ⬭ Graph/Table
                                          │Correlator│        Generator
┌─────────────┐  ┌──────────┐             └──────────┘
│   Rover     │  │   Time   │
│Representation│ │  Filter  │
└─────────────┘  └──────────┘
```

Buttons (right side): ✛ | ⬚ | Connect | Delete Connect | Preview | Save | Cancel

Insert Element   Modify Element Attributes
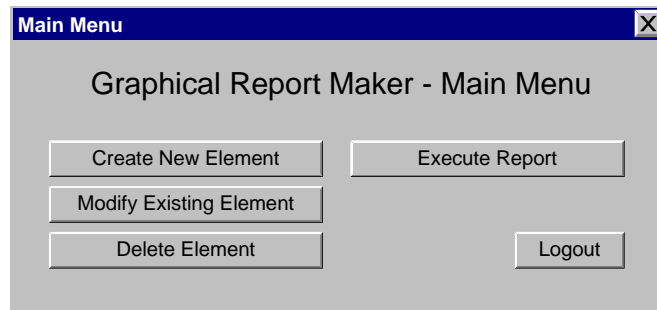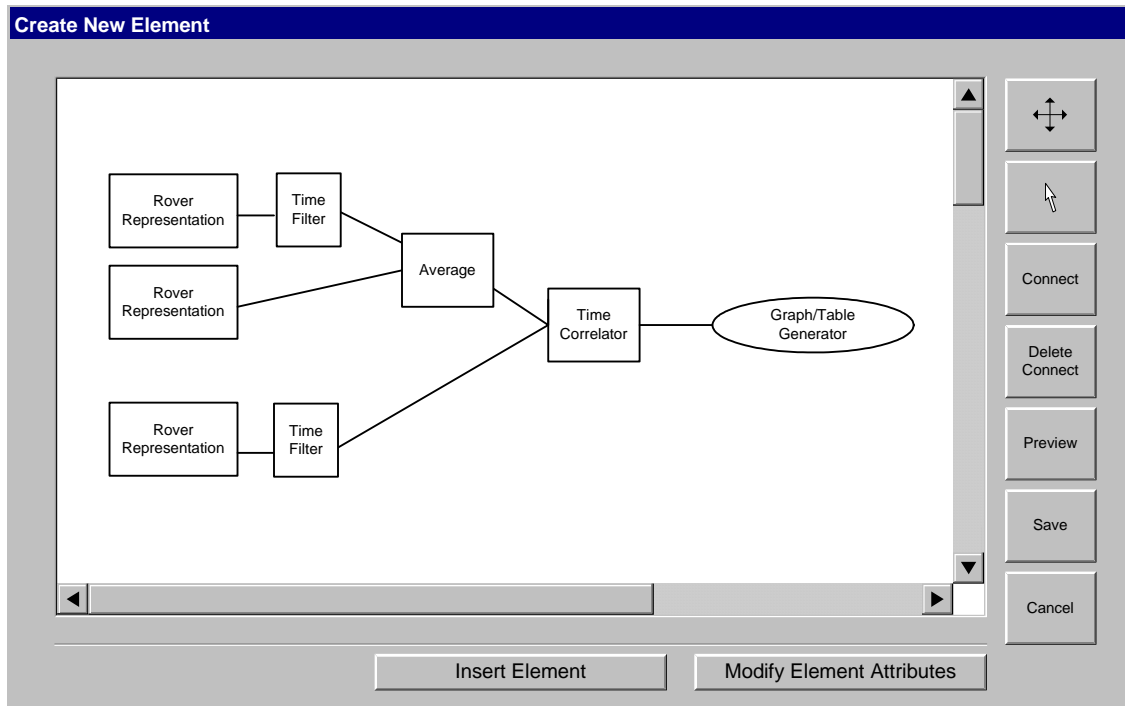
Figure 3: Create New Element

Insert Element

Available Elements:

availableElements ▼
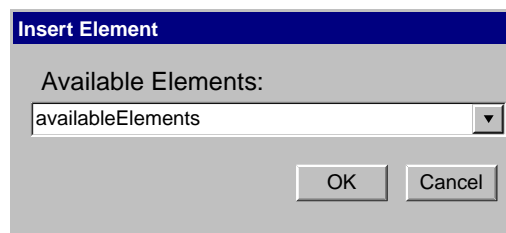
OK   Cancel

Figure 4: Insert Element

Insert Rover

Source:

| SrcNames | ▼ |

Data:

| Data1 | ▼ |

| Data2 | ▼ |

| Data3 | ▼ |

Time Extract Options:

○ Static   ● Dynamic

| FromDate | ▼ | | TimePeriod | ▼ |

| ToDate | ▼ | | TimeInterval | ▼ |

| TimeInterval | ▼ | | TimeBuffer | ▼ |

| TimeBuffer | ▼ | [Insert] [Cancel]

Figure 5: Insert Rover

Insert Operation

Preview

Op Name

Attributes	Values

[Insert] [Cancel]

Figure 6: Insert Operation

Insert Generator

Average Mail Server Send Latency per Month

DataSet1 Attributes
DataSet2 Attributes
DataSet3 Attributes

Add Data Set   Edit Data Set

Title:

X-Axis Label:

Y-Axis Label:

Graph Size:

X

Key Position:

☑ X Grid   ☑ Y Grid
☑ Logarithmic Scaling
☑ Show Data Point Labels

Add Data Set

Label:

Color:

OK   Cancel

Insert   Cancel

Figure 7: Insert Generator

Modify Existing Element

Available Saved Elements:

availableElements

OK   Cancel

Figure 8: Modify Existing Element

Modify Existing Element

Rover Representation — Time Filter
Rover Representation
Average
Rover Representation — Time Filter
Time Correlator
Graph/Table Generator

Connect

Delete Connect

Preview

Save

Cancel

Insert Element   Modify Element Attributes

Save Rover

Enter Rover Name:

[   ]

[Save]   [Cancel]

Overwrite Existing Rover?

A Rover with this name has already been defined. Would you like to overwrite this Rover?

[Yes]   [No]

Save Operation

Enter Operation Name:

[   ]

[Save]   [Cancel]

Overwrite Existing Operation?

An Operation with this name has already been defined. Would you like to overwrite this Operation?

[Yes]   [No]

Save Generator

Enter Generator Name:

[   ]

[Save]   [Cancel]

Overwrite Existing Generator?

A Generator with this name has already been defined. Would you like to overwrite this Generator?

[Yes]   [No]

Save Report

Enter Report Name:

[   ]

[Save]   [Cancel]

Overwrite Existing Report?

A Report with this name has already been defined. Would you like to overwrite this Report?
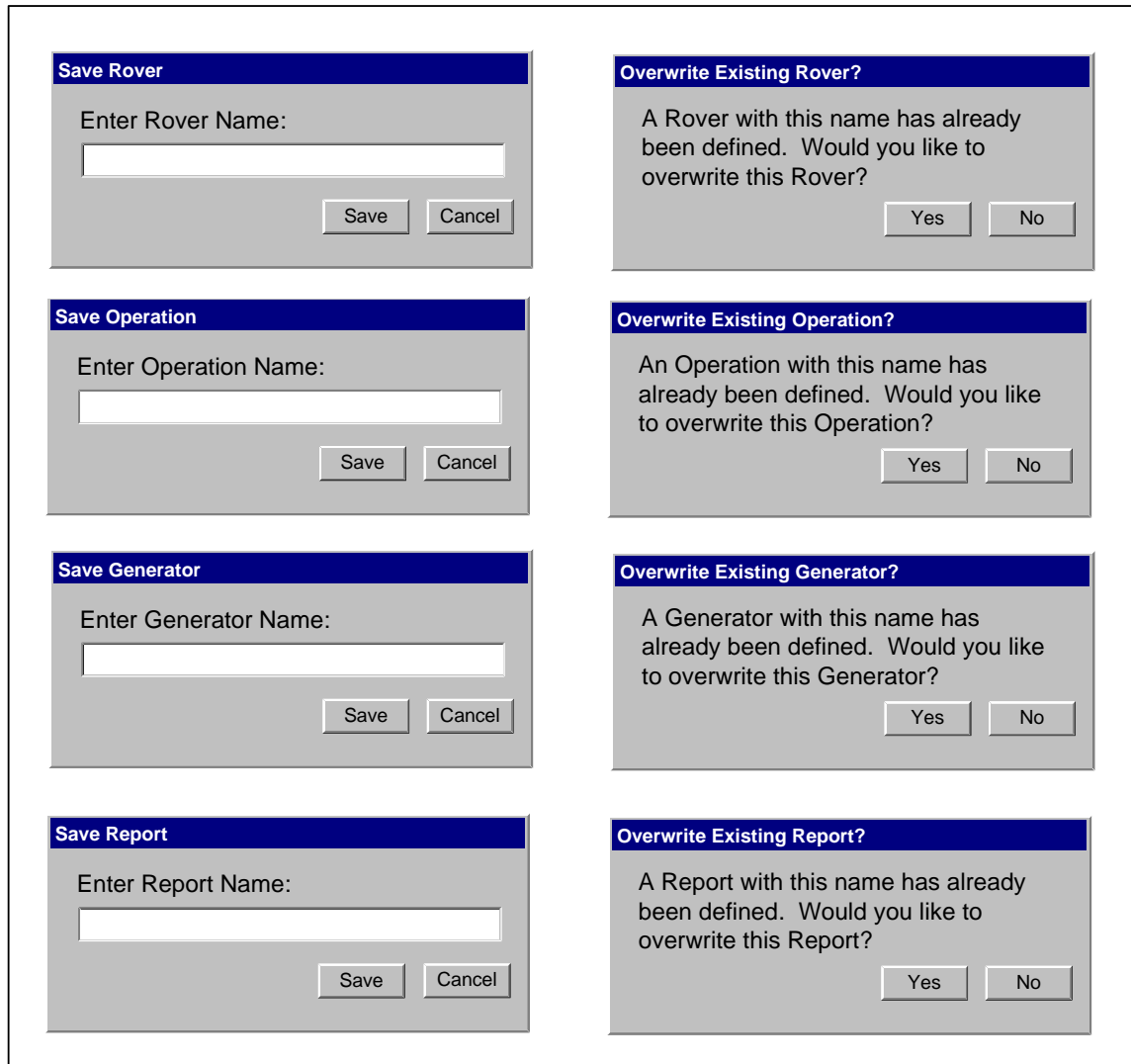
[Yes]   [No]
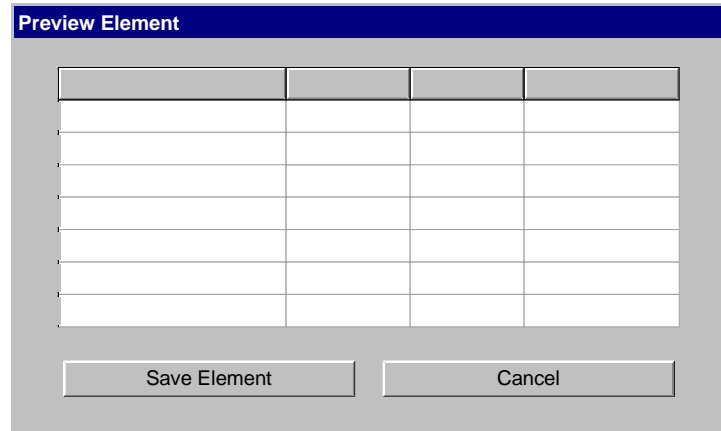
Figure 9: Save Rover, Operation, Generator, and Graph

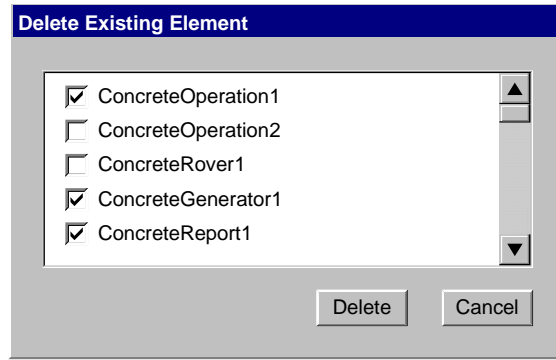Figure 10: Preview Element (Table)
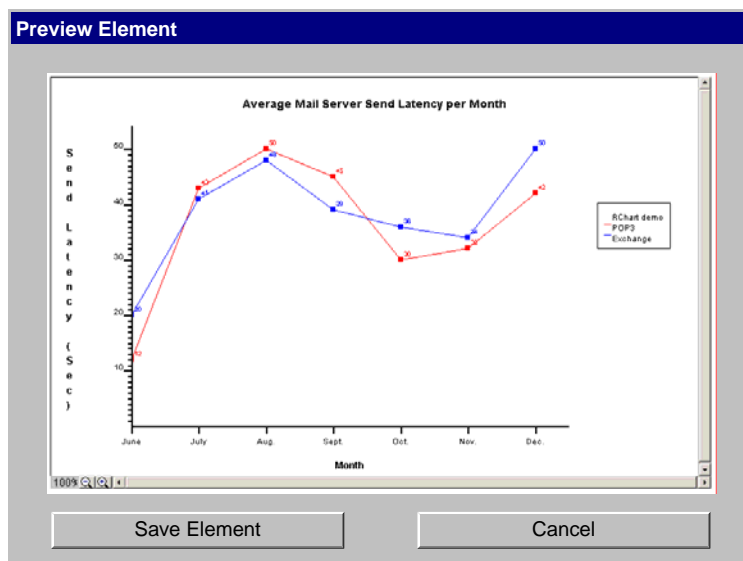
Figure 11: Preview Element (Graph)

Delete Existing Element

☑ ConcreteOperation1
☐ ConcreteOperation2
☐ ConcreteRover1
☑ ConcreteGenerator1
☑ ConcreteReport1

Delete　　Cancel

Figure 12: Delete Existing Element

Execute Report

Reports to Execute:

executableElements ▼

OK　　Cancel

Execute Report

Your report has been executed. Would you
like to view or export the report data?

View Report Data　　Export Report Data　　Cancel

Figure 13: Execute Report

Export Report Data

The Report "Name" has been
executed. Export Report data to:

pathName　　Browse

OK　　Cancel
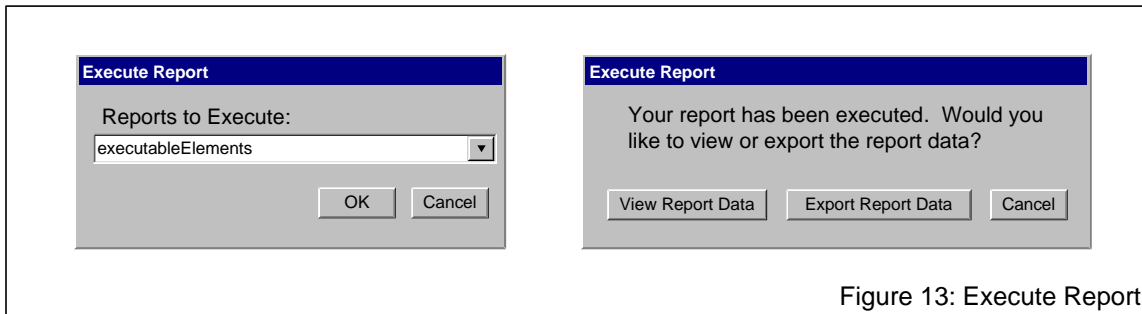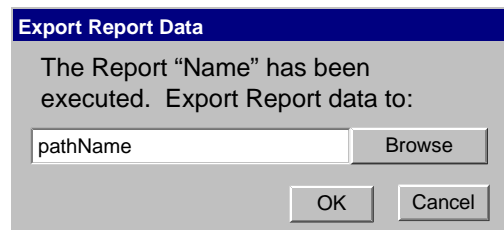
Figure 14: Export Report Data

8   Glossary

Command Prompt - The prompt as presented by the Console User Interface.

Console User Interface - The interface utilized by an external program or user using only text.

CUI - See Console User Interface

Element - Building block for defining the characteristics of an executable Report

Element Selection List - List that will contain all of the base and saved Elements within the system.

Generator - An Element with more than one input, and no output. Used to create graphs and tabular reports.

Graphical Report Maker - The name of this software project.

Graphical User Interface - The interface used by a human alone to build the report for execution.

GRM - See Graphical Report Maker

GUI - See Graphical User Interface

Operation - An Element with one or more inputs and one or more outputs. Used to perform manipulations on data.

Report - An Element with no inputs or outputs. Executing a Report Element creates a report.

Rover - An Element with no inputs and one or more outputs. Used to retrieve data from the database.

Software Requirements Specification - This document; specifically, a detailed requirements listing for use by the developers when designing and implementing the project.

SRS - See Software Requirements Specification