Appendix A: Definitions

A.1 General definitions

A.1.1 Software Risk Management

Software Risk Management is a software engineering practice with processes, methods, and tools for managing risks in a project. It provides a disciplined environment for proactive decision making to

- assess continuously what could go wrong (risks)
- determine which risks are important to deal with
- implement strategies to deal with those risks

The objectives of risk management are to identify, address, and reduce/eliminate risk items before they become either threats to successful software development or major sources of software rework.

A.1.2 Risk Definition

The exposure/possibility of harm, loss, injury, disadvantage or destruction.

Example:

Risk name: Inaccurate in estimation of test facility.

Condition: The estimated schedule and resources for integration and test at the test facility may be inaccurate.

Consequences: Delays in testing and inefficient testing time could lead to a defective product.

A.1.3 Risk Mitigation

Risk mitigation is the function of developing strategies and specific activities to alleviate and eliminate the threat posed by risks to the success of the program or project. The mitigation function is performed by identifying areas where the program or project can focus its resources for effectively addressing the risks.

Example:

To address the risk of insufficient experience with new hardware architecture, the mitigation strategies could be:

- provide training for the development team
- hiring experience personnel
- finding a consultant to work with the project team.

A.1.4 Severity level

Level	Descriptions
CRITICAL	High probability of the risk severely impacting one or more factors i.e., cost, schedule, and performance.
HIGH	High likelihood of the risk moderately impacting one or more factors.
MEDIUM	Medium likelihood of the risk moderately impacting one or more factors.
LOW	Low likelihood of the risk moderately impacting one or more factors.

A.1.5 Risk Level

	High	Medium	Low
Impact level	1	2	3
Probability of impact	1	2	3

	Near	Medium	Far
Time frame	1	2	3

$$\text{Risk Level} = \frac{\text{Impact} + \text{Probability} + \text{Time Frame}}{2}$$

A.1.6 Status Definitions

Status	Definition
OPEN	The risk has not been dealt with yet, just recorded.
PENDING	There is a solution; mitigation has begun.
CLOSED	The risk is resolved and closed.
ACCEPTED	The risk is recognized, but does not need to be addressed. The impact should be minimal to none.
WITHDRAWN	It has been determined that the reported risk is really not a risk.
REOPENED	The risk although thought to be closed, still needs to be addressed.
CLOSED with CAUTION	The risk has been closed, but it still needs to be checked occasionally.

A.1.7 Lines Of Code (LOC)

A line of code is any line of program text that is not a comment or blank line, regardless of the number of statements or fragments on the line. This specifically includes all lines containing program headers, declarations and executable & non-executable statements.

A.1.8 Function Points (FP)

Function points are derived using an empirical relationship based on countable (direct) measures of software's information domain and assessments of software complexity.

5 information domain characteristics are determined & counted:

1. Number of user inputs: Each user input that provides distinct application-oriented data to the software is counted. Inputs should be distinguished from inquiries.
2. Number of user outputs: Each user output that provides application-oriented information to the user is counted. In this context outputs refer to reports, screens, errors messages etc. Individual data items within a report are not counted separately.
3. Number of user inquiries: An inquiry is defined as an on-line input that results in the generation of some immediate software response in the form of an on-line output. Each distinct inquiry is counted.
4. Number of files: Each logical master file (i.e., a logical grouping of data that may be one part of a larger database or a separate file), is counted.
5. Number of external interfaces: All machine-readable interfaces (e.g. data files on tape or disk) that are used to transmit information to another system are counted.

$$FP = count\ -total\ * \left[0.65 + 0.01 * \sum F_i\right]$$

Count-total = the sum of all entries

F_i are complexity adjustment values.

Constant values in the equation & the weighting factors are determined empirically.

A.2 Risk Record Field Definitions

Field	Definitions
Project ID	This field is automatically assigned and is used to reference a project. It is unique and cannot be changed by the user.
Project Name	The full name of the project of which the risk is being reported under.
Project size	There are two different measurement for project size: Kilo (thousand) Line Of Codes (KLOC) and Function Points (FP).
Project Duration	This is an estimated time needed to complete a software project. It is defined in months.
Staff Size	This is the number of people directly involve in the software development project.
Project Cost	Price agreed upon between developer's organization and client to develop a project. It is defined in kilos (thousands) dollars.
Project Type	Categorization of a project. Examples: application software, utility program, and AI program.
Complexity Level	The difficulty level to develop a project. There are five levels: 1 – very high 2 – high 3 – average 4 – low 5 – very low

Field	Definitions
Automated Tools	These are the software tools used to support and facilitate software development process. User can select more than one tool. • Information Engineering Tools • Process Modeling & Management Tools • Project Planning Tools • Risk Analysis Tools • Project Management Tools • Requirement Tracing Tools • Metrics and Management Tools • Documentation Tools • System Software Tools • Quality Assurance Tools • Database Management Tools • Software Configuration Management Tools • Analysis and Design Tools • Prototyping and Simulation tools • Interface Design and Development Tools • Prototyping Tools • Programming Tools • Integration and Testing Tools • Static Analysis Tools • Dynamic Analysis Tools • Test Management Tools • Client/server Testing Tools • Reengineering Tools
Process Model	The type of life cycle being used on the project by the development team, such as waterfall, prototyping, RAD and spiral.

Field	Definitions
Programming Language	This is the language used to develop the software program. Examples: Visual Basic, Visual C++, Visual J++, Java, C++, C, and Pascal.
Date Opened	The date when the risk form was first created.
Date Updated	This is the date when the record was last edited. It should be filled out every time a change is made.
Risk ID	This field is automatically assigned, and cannot be changed by the user. All records in a project are uniquely numbered starting at 1.
Risk Name	Name given to the risk. This should be as close as possible described the risk.
Risk Identifier	The name of the person who discovered the risk.
Risk Mitigator	This is the person assigned to reduce/mitigate the risk. If any questions arise about the risk, he/she is the one who should be contacted.
Risk Conditions	This is the situation that will cause problem. It is a concise articulation of a program condition leading to risks, with one or more consequences foreseen from that condition and the indications of the sources of the underlying condition.
Risk Consequences	The effect/impact of the associated risk conditions to a project.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetProjects
Modifiers, type:	public void
Arguments:	int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillItems
Modifiers, type:	public void
Arguments:	int, unit
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillStuff
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

A.3 Statistics

A.3.1 The Mean

The mean, commonly known as average is obtained by summing all values and dividing by the sample size. To generalize this, suppose a sample of n observations is denoted by $x_1, x_2, \ldots\ldots\ldots, x_n$. Then the average or mean, denoted by $\bar{x}$, is given by:

$$\bar{x} = \frac{1}{n}(x_1 + x_2 + \ldots\ldots\ldots\ldots + x_{n)}$$

The sum of all the x values is abbreviated to $\sum x_i$ (where $\sum$ is sigma, the Greek equivalent of our S as in Sum). Thus

Mean, $\bar{x} = \frac{1}{n}\sum x_i$ where i = 1, 2,.........., n

A.3.2 The Median

The median is the middle value or the 50th percentile of the given observations. It is the value that splits the distribution into two halves.

When the sample size, n is even, there are two middle values, and the median is defined as their midpoint (the average of the two middle values).

A.3.3 The Mode

The mode of a distribution is the value that occurs most frequently. It is the value where the distribution peaks.

Example: 2, 4, 3, 5, 8, 10, 3, 3

Mode for this set of data is 3 since number 3 occurs three times.

It is also possible to draw a sample where the largest frequency occurs twice (or more). Then there are two peaks, and the distribution is called bimodal.

A.3.4 The Standard Deviation

The standard deviation is the most useful measure of spread. It is the positive square root of the arithmetic mean of the squares of the deviations of the given values from their mean. The square of the deviation from the mean is considered for each value of x.

The standard deviation of a set of n numbers, x_1, x_2,.........., x_n, with mean $\bar{x}$ is given by:

Standard deviation, $\sigma = \sqrt{\frac{1}{n} * \Sigma(x_i - \bar{x})^2}$ where i = 1, 2,........, n.

Sometimes the abbreviation s.d. is used for standard deviation.

A.3.5 Variance

The variance of a set of numbers is given by σ^2 where

$$\sigma^2 = \frac{1}{n}\sum(x_i - \bar{x})^2$$

We have Standard Deviation = $\sqrt{\text{var}\,iance}$

A.3.6 Coefficient of Variation

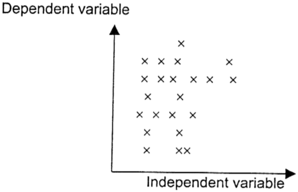
This is the percentage variation in the mean, standard deviation being considered as the total variation in the mean.

$$c.v. = \frac{\sigma}{\bar{x}} * 100$$

where σ is the standard deviation and $\bar{x}$, the mean of a distribution.

A.3.7 Scatter Diagram

A scatter diagram vividly portrays the relationship of two variables. It usually relates to investigative work and requires precise data. Scatter diagrams is often used together with other techniques such as correlation analysis and regression.



The X-axis is for the independent variable and the Y-axis for the dependent variable. Each point in a scatter diagram represents an observation of both the dependent and independent variables. Scatter diagrams aid data-based decision making (for instance, if action is planned on the X variable and some effect is expected on the Y variable). One should always look for a scatter diagram when the correlation coefficient of two variables is presented. This is because the method for calculating the correlation coefficient is highly sensitive to outliers, and a scatter diagram can clearly tell whether there are outliers in the relationships.

A.3.8 Correlation

Correlation is a measure of the strength of linear relationship between two variables. It is always important to establish the relationship between two variables for prediction and other purposes. This can be achieved by correlation analysis.

Let x and y be the two variables where x is the independent variable while y is the dependent variable. The correlation coefficient, *r*, measures the strength of the association between x and y can be expressed as,

$$r = \frac{\frac{1}{n} * \Sigma xy - \bar{x} * \bar{y}}{\sigma_x * \sigma_y}$$

where n is the sample size, $\bar{x}$ and $\bar{y}$ are the means of x and y respectively, σ_x and σ_y are the standard deviations of x and y respectively. The value of *r* can take on the value from –1.0 to 1.0. If *r* = 0 then the two variables are not correlated; *r* =1 indicates the perfect positive correlation whereas *r* = -1 indicates the perfect negative correlation.

A.3.9 Test For the Significance of Correlation Coefficient.

The correlation coefficient is the measure of the degree of the relationship between two variables. The extent of relationship is tested (using t-test) for its significance using the formula,

$$t = r * \frac{\sqrt{(n-2)}}{\sqrt{(1-r^2)}}$$

In all tests, if the probability value is less than 0.05, there is evidence that the relationship between the two variables is statistically significance.

A.3.10 Regression

The main purpose of statistical treatment on two variables is to estimate a value of the dependent variables given a value of the independent variable. In regression analysis we estimate the dependent variable using the independent variable based on the relationship between the two variables by expressing one in terms of linear function of the other.

A regression line is the line described by the equation and the regression equation is the formula for the line.

The linear regression equation for two variables x and y is given by:

Y = a + b*X where X is the independent variable, Y is the dependent variable, *a* and *b* are constants to be found out from the given data. Here *a* is known as the intercept and *b* is the slope of the line. The calculation involved in the regression analysis are briefly explained below:

The regression equation can also be written as

$(y-\overline{y}) = b*(x-\overline{x})$ where *b* is the regression coefficient, $b = r*\frac{\sigma_y}{\sigma_x}$. The value of *a* can be obtained as $a = \overline{y} - b*\overline{x}$

Note: Using the regression equation to predict values of the dependent variable outside the range of the independent variable is not recommended since there is no evidence that the same linear relationship exists outside the observed range.

A.3.11 t-Distributions Table

Degree of freedom (n – 2)	0.05 confident level
1	12.71
2	4.303
3	3.182
4	2.776
5	2.571
6	2.447
7	2.365
8	2.306
9	2.262
10	2.228
11	2.201
12	2.179
13	2.160
14	2.145
15	2.131
16	2.120
17	2.110
18	2.101
19	2.093
20	2.086
21	2.080
22	2.074
23	2.069
24	2.064
25	2.060
26	2.056
27	2.052
28	2.048
29	2.045
30	2.042
40	2.021
60	2.000
120	1.980
Infinity	1.960

For $T_{\text{calculated}} \geq T_{\text{table}}$, we reject the hypothesis, and conclude that there is evidence at the 5% level, that the correlation of two variables are significant.

For $T_{\text{calculated}} < T_{\text{table}}$, we accept the hypothesis, and conclude that there is evidence at the 5% level, that the two variables are not related.

Appendix B: Class Design

There are 25 classes for The Statistical Manager. These classes are arranged in ascending alphabetical order with respect to the class name.

1. Class name: Autotools

Narrative: Displays an input screen that prompts the user to select from a list of automated tool. The user, however, may skip this screen if none of the tools is used.

Method name:	InitValue
Modifiers, type:	public void
Arguments:	char, char
Error messages:	None
Files accessed:	None
File changed:	None

2. Class name: Configution

Narrative: Displays a dialog screen that enables the user to set the system configuration.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetRegistry
Modifiers, type:	public void
Arguments:	RiskReg
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ResetContents
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ClearPortion
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	LoadItem
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	None

3. Class name: Confirm

Narrative: Displays a message box that prompts the user to confirm his/her actions. It shows messages like "Are you sure?" and "Yes" and "No" button.

Method name:	SetValues
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	None
File changed:	None

4. Class name: CriskDlg

Narrative: Responsible for the login screen: get the user name, password, and track login.

Method name:	ResetFields
Modifiers, type:	private void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	AskConfiguration
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	User defined file

Method name:	GracefulShutDown
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetDate
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	System file
File changed:	User defined file

5. Class name: DateSelect

Narrative: Dialog screen that displays when the user have selected to set criteria based on the date field. The user may specify dates of interest.

Method name:	SetValues
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	DateType
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	None

6. Class name: DelProject

Narrative: Dialog that prompts the user to select project (s) to be deleted. The user may select from a list of existing project. However, if the selected project does not belong to the user, the deletion will be cancelled. A message will be displayed.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetStartItems
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	None

7. Class name: EnterValue

Narrative: Prompts the user to enter a numeric value when the selected fields are of numeric type.

Method name:	GetVal
Modifiers, type:	public float
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

8. Class name: FpKloc

Narrative: Gets input for project size measurements. The user may select between the two project size measurements, the function point and kilo lines of codes.

Method name:	SetVar
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	None

9. Class name: Password

Narrative: Displays a dialog screen that enables the normal user to change his/her password.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	ValidateString
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	None

10. Class name: Project

Narrative: Displays a dialog screen, offering the user a choice of creating a new project, opening an existing project or deleting a project. The user may also choose to return to main menu.

Method name:	SetDestinations
Modifiers, type:	public void
Arguments:	int, char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetDataBase
Modifiers, type:	public void
Arguments:	RiskDataBase (user defined database)
Error messages:	None
Files accessed:	User defined file
File changed:	None

11. Class name: ProjHist

Narrative: Displays a dialog to prompt the user to select from the available list of project histories to open.

Method name:	SetStartItem
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

12. Class name: ProjSelect

Narrative: Displays a dialog that prompts the user to select from the available projects or project histories. It is used when the user chooses to perform “Statistics” or “Report’.

Method name:	FillInListBox
Modifiers, type:	private bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetResultContainer
Modifiers, type:	public int
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

13. Class name: PropertyPage1

Narrative: Displays a dialog that prompts the user to enter his/her name and the company's name. This dialog is displayed when the user runs the program for the very first time.

Method name:	SetHandle
Modifiers, type:	public void
Arguments:	CPropertySheet
Error messages:	None
Files accessed:	None
File changed:	None

14. Class name: PropertyPage2

Narrative: Displays a dialog that prompts the user to enter his/her username, password and job title. This dialog is displayed only one time, i.e. during installation. The user account created for the very first time must be for system administrator (superuser).

Method name:	SetHandle
Modifiers, type:	public void
Arguments:	CPropertySheet
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetValues
Modifiers, type:	public void
Arguments:	char, char, char
Error messages:	If an attempt is made to proceed before entering the required data.
Files accessed:	None
File changed:	None

Method name:	Validate
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ValidateString
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

15. Class name: PropertyPage3

Narrative: Displays a dialog that prompts the user to enter database login name, database password and database source name. This dialog is displayed only one time, i.e. during installation. The user may leave the database login name and password empty. The database source name, however, must be entered correctly. The selected database driver must be present in the user system/computer.

Method name:	SetHandle
Modifiers, type:	public void
Arguments:	CPropertySheet
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetRsikRegField
Modifiers, type:	public void
Arguments:	RiskRegField
Error messages:	If an attempt is made to proceed before entering the required data.
Files accessed:	None
File changed:	None

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	If an attempt is made to proceed before entering the required data.
Files accessed:	None
File changed:	None

Method name:	SetTheFlag
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

16. Class name: Query

Narrative: Displays a dialog that prompts the user to enter a query name before proceed to perform query.

Method name:	SetValues
Modifiers, type:	public void
Arguments:	char
Error messages:	If a query name has not been entered.
Files accessed:	None
File changed:	None

17. Class name: QueryForm

Narrative: Displays a query form, enabling the user to set criteria (s) to perform various queries and view format with respect to the database field.

Method name:	SetValues
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	FillItems
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	none

Method name:	CheckMainField
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	none

Method name:	ComposeStatement
Modifiers, type:	public bool
Arguments:	Int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SeverityChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	TotallyRemove
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	BuildSQLStatement
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	DateUpdatedChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	ValidateNumeric
Modifiers, type:	public bool
Arguments:	char, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	RemoveChar
Modifiers, type:	public void
Arguments:	char, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ValidateEditBox
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	AddOrderStatement
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillFields
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	CodeTypeChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	AutoToolsChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	ComplexityChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	StageChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	ImpactChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	StatusChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DateOpenedChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillInAutos
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	TimeFrameChoose
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

18. Class name: QueryResult

Narrative: Displays the query results, in a proper format to the user, specified by he/she earlier.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetValues
Modifiers, type:	public void
Arguments:	int, int, char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	FillFormWithResults
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillLabels
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetAutos
Modifiers, type:	public void
Arguments:	QueryForm
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetDestinations
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	AddHeaders
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	DrawLine
Modifiers, type:	public void
Arguments:	int, int, int, int
Error messages:	None
Files accessed:	None
File changed:	None

19. Class name: ReportGen

Narrative: Responsible for report generation, from project selection to printing.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetProjects
Modifiers, type:	public void
Arguments:	int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillItems
Modifiers, type:	public void
Arguments:	int, unit
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillStuff
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	PrintToFile
Modifiers, type:	public void
Arguments:	File, RowResultSet
Error messages:	None
Files accessed:	User defined file
File changed:	None

20. Class name: RiskDataBase

Narrative: Responsible for all activities perform on the database.

Method name:	MainInit
Modifiers, type:	private void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	TrapError
Modifiers, type:	private void
Arguments:	SQLRETURN, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DisplayError
Modifiers, type:	private void
Arguments:	SQLReturn, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillInfo
Modifiers, type:	private void
Arguments:	RowResultSet
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetOutputControl
Modifiers, type:	private void
Arguments:	CStatic
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	DisplayStatusMessage
Modifiers, type:	private void
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	PrepareSQLForExec
Modifiers, type:	private void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	InitiateConnection
Modifiers, type:	public void
Arguments:	char, char, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SelectiveConnection
Modifiers, type:	public void
Arguments:	char, char, char, HWND
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DoQuery
Modifiers, type:	public bool
Arguments:	char
Error messages:	If an invalid choice is entered
Files accessed:	User defined file
File changed:	None

Method name:	GetDates
Modifiers, type:	public bool
Arguments:	char, char, char
Error messages:	None
Files accessed:	System file
File changed:	None

Method name:	DeInitiateConnection
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	CreateRiskTable
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	RedoAvailableRisk
Modifiers, type:	public bool
Arguments:	char, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	EndAvailableRisk
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GenerateEntryID
Modifiers, type:	public int
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GenerateProjectID
Modifiers, type:	public int
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	DelSuperUser
Modifiers, type:	public void
Arguments:	None
Error messages:	If there is only one superuser in the user account.
Files accessed:	User defined file
File changed:	User defined file

Method name:	UserPresent
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	IsKLOC
Modifiers, type:	public int
Arguments:	Int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetAvlRisk
Modifiers, type:	public bool
Arguments:	int, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetRiskLevel
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetStaffSize
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetComplexity
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	UpdateUser
Modifiers, type:	public void
Arguments:	UserFields, char
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetProjectSize
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetDuration
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetCost
Modifiers, type:	public bool
Arguments:	float, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DeleteUserByName
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetUserByUserName
Modifiers, type:	public bool
Arguments:	char, UserField
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	AddEntry
Modifiers, type:	public void
Arguments:	RowResultSet
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetEveryRecord
Modifiers, type:	public bool
Arguments:	Int, RowResultSet, int, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GenarateRiskID
Modifiers, type:	public int
Arguments:	int, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetCurrentUser
Modifiers, type:	public void
Arguments:	UserFields
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetUserEntry
Modifiers, type:	public bool
Arguments:	char, char, UserFields
Error messages:	If an invalid input is entered
Files accessed:	User defined file
File changed:	None

Method name:	StartQueryProject
Modifiers, type:	public bool
Arguments:	char
Error messages:	If a query has not been entered
Files accessed:	User defined file
File changed:	None

Method name:	RedoQueryProject
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	EndQueryProject
Modifiers, type:	public int
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	RedoGetEveryRecord
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	EndGetEveryRecord
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	StartGetEveryRecord
Modifiers, type:	public bool
Arguments:	int, RowResultSet
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	RedoGetEveryTempRecord
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	EndGetEveryTempRecord
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	StartGetEveryTempRecord
Modifiers, type:	public bool
Arguments:	int, RowResultSet
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DeleteAllProject
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	SaveProjectAs
Modifiers, type:	public void
Arguments:	int, int
Error messages:	If a project with a similar name is present
Files accessed:	User defined file
File changed:	User defined file

Method name:	RemoveUser
Modifiers, type:	public void
Arguments:	UserField
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	CreateTempTable
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	TestConnection
Modifiers, type:	public bool
Arguments:	char, char, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	AddUser
Modifiers, type:	public void
Arguments:	UserField
Error messages:	If a user with a similar name is present
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetProjectSize
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetRiskLevels
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetStaffSize
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetDuration
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetComplexity
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GetCost
Modifiers, type:	public bool
Arguments:	float, int, int, int, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SaveProject
Modifiers, type:	public void
Arguments:	RowResultSet
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetLoginParameters
Modifiers, type:	public void
Arguments:	char, char, char
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

21. Class name: RiskForm

Narrative: Displays a risk form, to obtain data for all input fields, except the input field for automated tool. New projects and risk records will be created here. Derived fields such as Risk Level and Severity Level are also computed.

Method name:	CalculateLevel
Modifiers, type:	private void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	ValidateAll
Modifiers, type:	public bool
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	GenerateIDs
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	CreateNew
Modifiers, type:	public void
Arguments:	None
Error messages:	If a project with a similar name is present
Files accessed:	User defined file
File changed:	User defined file

Method name:	OpenExisting
Modifiers, type:	public void
Arguments:	None
Error messages:	If the project specified does not exist.
Files accessed:	User defined file
File changed:	None

Method name:	SaveCurrentRisk
Modifiers, type:	public bool
Arguments:	None
Error messages:	If a record with a similar name is present.
Files accessed:	User defined file
File changed:	User defined file

Method name:	InitializeStart
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	InitializeStruc
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	InitializeRisk
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetActivity
Modifiers, type:	public void
Arguments:	int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	SetValues
Modifiers, type:	public void
Arguments:	char, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	FillIn
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	UserValid
Modifiers, type:	public bool
Arguments:	None
Error messages:	If the user is not the owner of the project
Files accessed:	User defined file
File changed:	None

Method name:	SeverityFind
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetDate
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	System file
File changed:	None

Method name:	UseOldDate
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	System file
File changed:	None

Method name:	OpenRisk
Modifiers, type:	public void
Arguments:	int
Error messages:	If an invalid record is entered.
Files accessed:	User define file
File changed:	None

Method name:	SetInitRisk
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetLimits
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetAutoTools
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ValidateString
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	RemoveChar
Modifiers, type:	public void
Arguments:	char, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	ValidateNumeric
Modifiers, type:	public bool
Arguments:	char, int
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetHideDialog
Modifiers, type:	public void
Arguments:	CDialog
Error messages:	None
Files accessed:	None
File changed:	None

22. Class name: RiskReg

Narrative: Responsible for window registry activities: configuration of database and log file set up.

Method name:	GetDatabaseConfig
Modifiers, type:	public bool
Arguments:	RiskRegField
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	PutDatabase
Modifiers, type:	public bool
Arguments:	RiskRegField
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	GetLogFile
Modifiers, type:	public bool
Arguments:	char
Error messages:	If a log file with similar name is present.
Files accessed:	User defined file
File changed:	User defined file

Method name:	PutLogFile
Modifiers, type:	public bool
Arguments:	char
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

Method name:	RemoveKey
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	User defined file

23. Class name: SaveProj

Narrative: Displays a dialog to prompt the user to select between two alternatives: to save the modified project as an updated copy or overwrite the existing one.

Method name:	SetUserMatch
Modifiers, type:	public void
Arguments:	bool
Error messages:	If the user is not the owner of the project.
Files accessed:	User defined file
File changed:	User defined file

24. Class name: Statistics

Narrative: Responsible for all statistical functions: accessing to database, calculating the mean, median, mode, standard deviation, variance, and coefficient of variance, setting the axis, drawing graph frame and lines, printing header, plotting points, performing correlation and regression, estimating, and displaying text messages.

Method name:	SetProject
Modifiers, type:	public void
Arguments:	int
Error messages:	If an invalid number of projects is selected.
Files accessed:	User defined file
File changed:	None

Method name:	SetDataBase
Modifiers, type:	public void
Arguments:	RiskDataBase
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	Present
Modifiers, type:	public int
Arguments:	float
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetMode
Modifiers, type:	public float
Arguments:	float, int
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	FillAxises
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	User defined file
File changed:	None

Method name:	DrawGraphFrame
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	PutRulers
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	GetScale
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	RoundTo
Modifiers, type:	public float
Arguments:	float
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	PrintHeader
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	PrintNextHeader
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	PrintNextNextHeader
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	DrawEstimates
Modifiers, type:	public void
Arguments:	None
Error messages:	If the correlation has not been performed
Files accessed:	User defined file
File changed:	None

Method name:	GetRegression
Modifiers, type:	public float
Arguments:	float, float, int, int, float, float, float
Error messages:	If the correlation has not been performed
Files accessed:	User defined file
File changed:	None

Method name:	DrawPoint
Modifiers, type:	public void
Arguments:	int, int
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	PlotPoint
Modifiers, type:	public void
Arguments:	None
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	ClearOutput
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	CalculateT
Modifiers, type:	public float
Arguments:	float, int
Error messages:	If the regression has not been performed.
Files accessed:	User defined file
File changed:	None

Method name:	DrawGraph
Modifiers, type:	public void
Arguments:	float, float
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	DrawLine
Modifiers, type:	public void
Arguments:	int, int, int, int
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User define file
File changed:	None

Method name:	Correlate
Modifiers, type:	public float
Arguments:	float, float, int, int
Error messages:	If the independent and dependent variables have not been specified.
Files accessed:	User defined file
File changed:	None

Method name:	FindStandardDeviation
Modifiers, type:	public float
Arguments:	float, int, float
Error messages:	If an insufficient number of projects is entered.
Files accessed:	User define file
File changed:	None

Method name:	DoSort
Modifiers, type:	public void
Arguments:	float, int
Error messages:	If an order has not been specified.
Files accessed:	User define file
File changed:	None

Method name:	GetValues
Modifiers, type:	public bool
Arguments:	int, int
Error messages:	If an invalid value is entered.
Files accessed:	None
File changed:	None

Method name:	AppendText
Modifiers, type:	public void
Arguments:	char
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetFields
Modifiers, type:	public bool
Arguments:	None
Error messages:	If fields have not been chosen
Files accessed:	User define file
File changed:	None

Method name:	FillTTable
Modifiers, type:	public void
Arguments:	None
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	CalculateTTable
Modifiers, type:	public float
Arguments:	int
Error messages:	None
Files accessed:	User define file
File changed:	None

Method name:	FindMean
Modifiers, type:	public float
Arguments:	float, int
Error messages:	None
Files accessed:	User define file
File changed:	None

Method name:	SummationXY
Modifiers, type:	public float
Arguments:	float, float, int
Error messages:	None
Files accessed:	User define file
File changed:	None

25. Class name: UserDialog

Narrative: Responsible for the main menu. Captures and displays the user name, type and job title.

Method name:	SetDatabase
Modifiers, type:	public void
Arguments:	RiskDatabase
Error messages:	If an invalid choice is entered
Files accessed:	User defined file
File changed:	User defined file

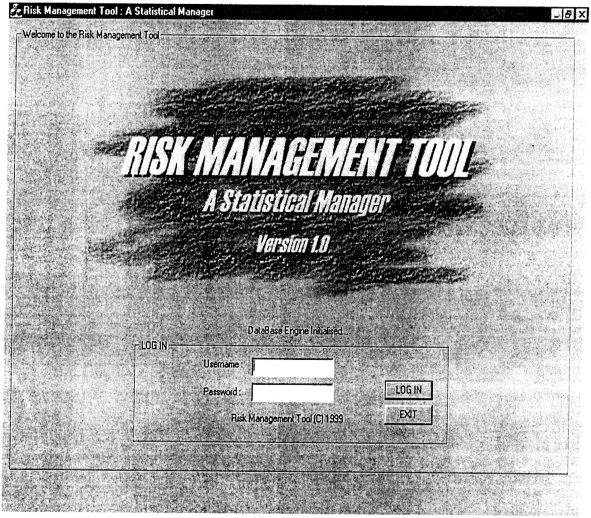
Method name:	SetRegistry
Modifiers, type:	public void
Arguments:	RiskReg
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	SetHideDialog
Modifiers, type:	public void
Arguments:	Cdialog
Error messages:	None
Files accessed:	None
File changed:	None

Method name:	GetUserName
Modifiers, type:	public void
Arguments:	char, char, char
Error messages:	None
Files accessed:	User defined file
File changed:	None

Appendix C: Screen Design and Snapshots

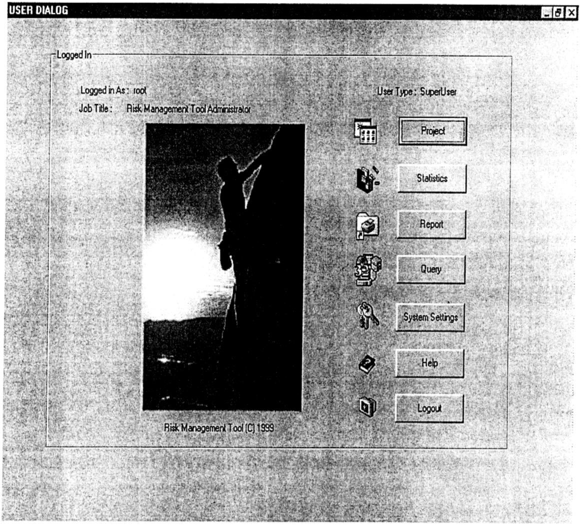
The usage of the tool is illustrated further in this section. Some of the screen captures are not in their actual sizes. They are scaled down so that they can fit into these pages.


Risk Management Tool : A Statistical Manager
Welcome to the Risk Management Tool
RISK MANAGEMENT TOOL
A Statistical Manager
Version 1.0
DataBase Engine Initialised...
LOG IN
Username :
Password :
LOG IN
EXIT
Risk Management Tool (C) 1999

Screen C.1: Login interface.

Screen C.1 shows the start-up/opening screen. It also serves as a login interface. The user will be able to see this screen if a database source has been set up correctly. The name and version of the tool are displayed here. A username and a password of up to 10 characters long consisting of no special character must be entered correctly in order to log in to the tool. The System Administrator (Superuser) sets up user accounts in the

System Setting. The user can exit from the tool by either clicking the **EXIT** button or the **CLOSE (x)** button at the upper right corner.



USER DIALOG

Logged In

Logged in As : root

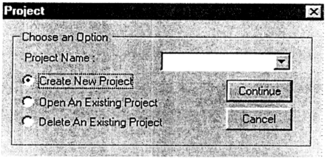
Job Title : Risk Management Tool Administrator

User Type : SuperUser

Risk Management Tool (C) 1999

Screen C.2: The main menu screen.

Screen C.2 shows the main menu screen which will be displayed if a user has successfully logged in. The upper portion of the screen displays the user login name, the job title and the user type/rank. The main menu consists of seven command buttons, each with its specific functions, which will be explained in the later part of this chapter. Unique and meaningful names are given to each of this buttons to indicate its functions.



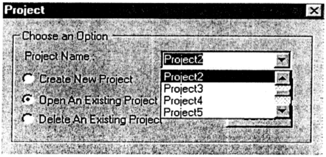
Screen C.3: Create New Project Dialog.

Screen C.3 appears when a user selects **Project** at the main menu screen. Three options are available:

- Create a New Project
- Open An Existing Project
- Delete An Existing Project

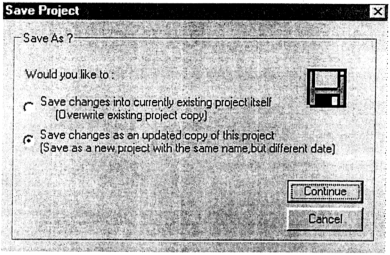
The last two options may be selected only if a project database file has been created.

When a user chooses to create a new project, he/she will be asked to enter a name for the new project. This name needs to be typed at the input field at **Project Name**. A form will then pop up.



Screen C.4: Open an Existing Project Dialog.

To open an existing project, a user must choose from the available project list by clicking the drop down menu (▼) at **Project Name.** Each listing refers to the collection for that project alone. To select a project, highlight the desired name. It will be loaded automatically.



Save Project

Save As ?

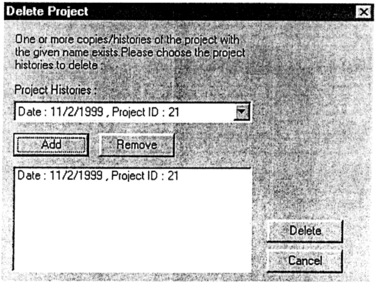
Would you like to :

○ Save changes into currently existing project itself (Overwrite existing project copy)

● Save changes as an updated copy of this project (Save as a new project with the same name,but different date)

Screen C.5: Save Project Dialog.

If a user opens an existing project and makes modifications to the project data or risk information, he/she will be prompted (as shown above) to either overwrite the existing project or to save changes as an updated copy (old copy will be archived) of that particular project. If a record is saved as an updated copy, the date will be changed.



Delete Project

One or more copies/histories of the project with the given name exists.Please choose the project histories to delete :

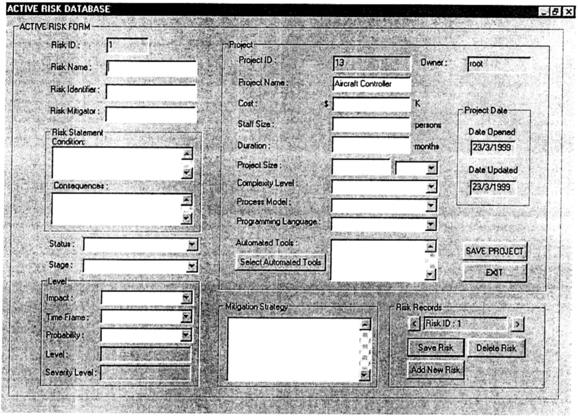
Project Histories :

Date : 11/2/1999 , Project ID : 21

Date : 11/2/1999 , Project ID : 21

Screen C.6: Delete Project Dialog.

To delete an existing project database, a user must select from the available project list and click **Add** button to add the project to the deletion list. Highlight the deletion list and click **Delete** button. For security reason, only the owner of the project (the one who had created it earlier) or the administrator of the tool is permitted to perform the deletions.



Risk ID : 1

Project ID : 13

Owner : root

Project Name : Aircraft Controller

Date Opened: 23/3/1999

Date Updated: 23/3/1999

Risk ID : 1

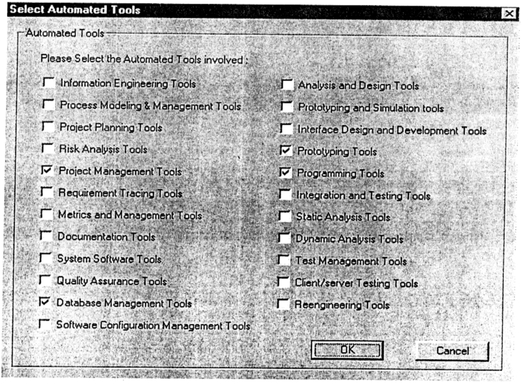
Screen C.7: User Input Form for Project data and Risk Information.

Screen C.7 will open when a user chooses to create a new project. It is the only user input form in the tool. All project data and risk information will be captured on this screen and saved into the database file. The form is separated into two sections, one section to capture risk information and the other for project data.

Project ID and **Risk ID** fields are automatically generated. **Project Date** and **Date Updated** are system dates. The owner (login name) and the name of the project (entered by the user) are also captured here.

All fields, except the **Automated Tools** field in this form must be completed before a user can save it. This is to ensure a systematic collection of project data and risk information. To enter data, simply click the intended field and type in the data. To maneuver between the fields simply hit TAB key as we would normally do to move around a window.

Many risks can exist for one project. A new risk record can be added by clicking the **Add New Risk** button. The risk number (automatically assigned) for a particular project is indicated under the **Risk Records**. The user can browse through these risk records, if there is more than one, by clicking the right or left direction arrows. **Risk Level** and **Severity Level** fields are derived fields. They are computed based on **Impact, Time Frame** and **Probability**. A complete list of definitions for all fields is provided in Appendix A.



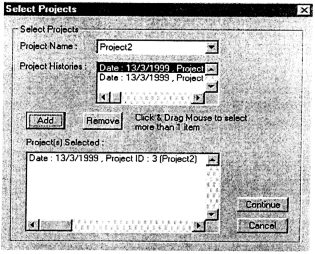
Please Select the Automated Tools involved :

□ Information Engineering Tools
□ Process Modeling & Management Tools
□ Project Planning Tools
□ Risk Analysis Tools
☑ Project Management Tools
□ Requirement Tracing Tools
□ Metrics and Management Tools
□ Documentation Tools
□ System Software Tools
□ Quality Assurance Tools
☑ Database Management Tools
□ Software Configuration Management Tools

□ Analysis and Design Tools
□ Prototyping and Simulation tools
□ Interface Design and Development Tools
☑ Prototyping Tools
☑ Programming Tools
□ Integration and Testing Tools
□ Static Analysis Tools
□ Dynamic Analysis Tools
□ Test Management Tools
□ Client/server Testing Tools
□ Reengineering Tools

Screen C.8: A List of Automated Tools.

When a user clicks the **Select Automated Tool** button at the user-input form, a list of available automated tools, as depicted above, will be provided to the user. It can be left blank, or the user can select the tools that he/she has used in the project development process by clicking the check boxes.



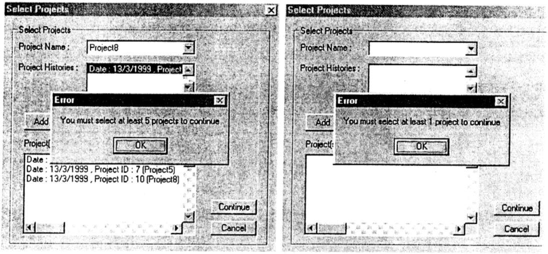
Project Name : Project2

Project Histories : Date : 13/3/1999 , Project
Date : 13/3/1999 , Project

Project(s) Selected : Date : 13/3/1999 , Project ID : 3 (Project2)

Screen C.9: Select Projects Dialog.

Screen C.9 will pop up when a user selects the **Statistics** or **Report** button at the main menu. To perform statistics, the user must select a minimum of five projects in order to obtain meaningful statistics; whereas a minimum of only one is required to activate **Report**. Error messages as shown below will be forwarded if the user select less than the specified number of projects. All available projects can be seen when the drop down (▾) at **Project Name** is clicked. A project can be added to, or removed from the **Project(s) Selected** display by highlighting the desired project and clicking the **Add** or **Remove** button respectively.



Project Name : Project8

Project Histories : Date : 13/3/1999 , Project

Error: You must select at least 5 projects to continue

Project(

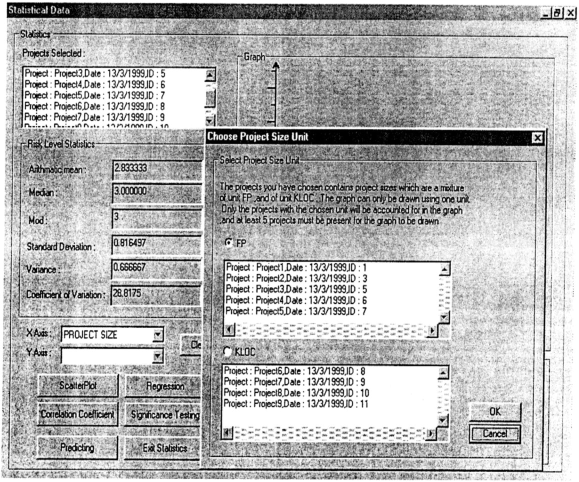
Date :
Date : 13/3/1999 , Project ID : 7 (Project5)
Date : 13/3/1999 , Project ID : 10 (Project8)

Project Name :

Project Histories :

Error: You must select at least 1 project to continue

Screen C.10: Select Projects Error Messages.



Projects Selected :

Project : Project3,Date : 13/3/1999,ID : 5
Project : Project4,Date : 13/3/1999,ID : 6
Project : Project5,Date : 13/3/1999,ID : 7
Project : Project6,Date : 13/3/1999,ID : 8
Project : Project7,Date : 13/3/1999,ID : 9

Arithmatic mean : 2.833333

Median : 3.000000

Mod : 3

Standard Deviation : 0.816497

Variance : 0.666667

Coefficient of Variation : 28.8175

X Axis : PROJECT SIZE

Y Axis :

The projects you have chosen contains project sizes which are a mixture of unit FP and of unit KLOC. The graph can only be drawn using one unit. Only the projects with the chosen unit will be accounted for in the graph and at least 5 projects must be present for the graph to be drawn

● FP

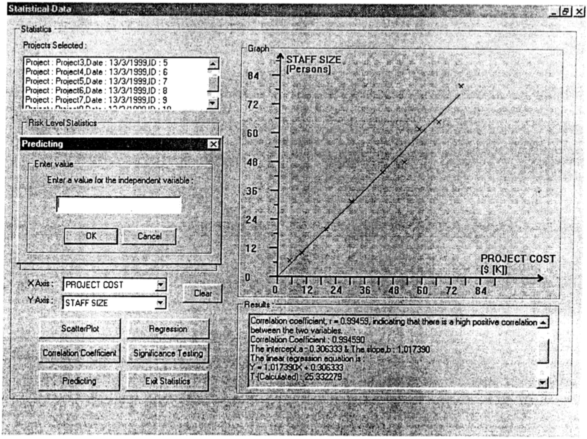
Project : Project1,Date : 13/3/1999,ID : 1
Project : Project2,Date : 13/3/1999,ID : 3
Project : Project3,Date : 13/3/1999,ID : 5
Project : Project4,Date : 13/3/1999,ID : 6
Project : Project5,Date : 13/3/1999,ID : 7

○ KLOC

Project : Project6,Date : 13/3/1999,ID : 8
Project : Project7,Date : 13/3/1999,ID : 9
Project : Project8,Date : 13/3/1999,ID : 10
Project : Project9,Date : 13/3/1999,ID : 11

Screen C.11: Back screen shows basic statistical calculations whereas front one shows project size measurement units.

When a correct number of projects of interest is selected, Screen C.11 above will be displayed. The upper left corner shows project particulars which are selected by the user. Below that is the **Risk Level Statistics** section that shows risk-level based statistical calculations. To proceed, the user must select the independent variable for **X-axis** and the dependent variable for **Y-axis**. However, if **Project Size** is selected for X-axis, a dialogue box will pop up, as shown above, requesting the user to select the project size measurement unit. This is because the projects selected by the user are of mixture of two size measurements, Function Points and KLOC. It is meaningless to draw a graph if the units of measurements are different.



Project : Project3,Date : 13/3/1999,ID : 5
Project : Project4,Date : 13/3/1999,ID : 6
Project : Project5,Date : 13/3/1999,ID : 7
Project : Project6,Date : 13/3/1999,ID : 8
Project : Project7,Date : 13/3/1999,ID : 9

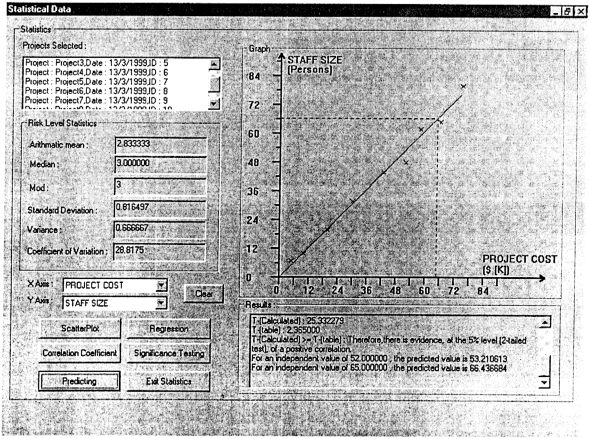
X Axis : PROJECT COST
Y Axis : STAFF SIZE

Correlation coefficient, r = 0.99459, indicating that there is a high positive correlation between the two variables.
Correlation Coefficient : 0.994590
The intercept,a : 0.306333 & The slope,b : 1.017390
The linear regression equation is :
Y = 1.017390X + 0.306333
T-(Calculated) : 25.332279

Screen C.12: Advanced statistical functions which shows results of correlation and regression.

When a pair of X-axis and Y-axis is selected, a user can proceed to perform more advanced statistics. Coordinates of X and Y will be plotted on the graph area when **ScatterPlot** button is pressed. The strength of relationship between the two variables, r, will be calculated and displayed in the text box at the lower right corner when **Correlation Coefficient** button is clicked. If there are some relationships, **Regression** button can be clicked. A regression equation will be computed. This line will be shown as a red line in the graph.

The tool is programmed to 95% level (two-tailed test) to test the significance of the relationship. Results of the test will be summarized in the text box. For prediction, once the **Predicting** button is pressed, a dialogue box will appear, as shown above, for the user to enter the value of the independent variable.



Projects Selected :

Project : Project3,Date : 13/3/1999,ID : 5
Project : Project4,Date : 13/3/1999,ID : 6
Project : Project5,Date : 13/3/1999,ID : 7
Project : Project6,Date : 13/3/1999,ID : 8
Project : Project7,Date : 13/3/1999,ID : 9

Risk Level Statistics

Arithmatic mean : 2.833333

Median : 3.000000

Mod : 3

Standard Deviation : 0.816497

Variance : 0.666667

Coefficient of Variation : 28.8175

X Axis : PROJECT COST

Y Axis : STAFF SIZE

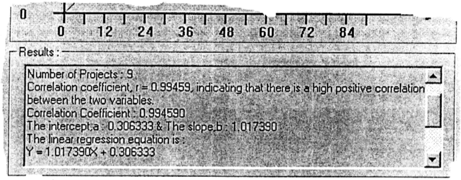
Results :

```
T-(Calculated) : 25.332279
T-(table) : 2.365000
T-(Calculated) >= T-(table) : Therefore,there is evidence, at the 5% level (2-tailed
test), of a positive correlation.
For an independent value of 52.000000 , the predicted value is 53.210613
For an independent value of 65.000000 , the predicted value is 66.436684
```

Screen C.13: Advanced statistical functions with prediction.

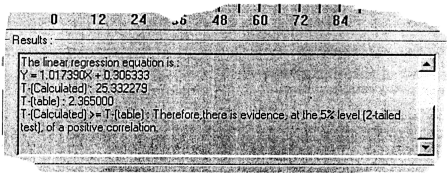
When a user enters the independent X-value for prediction, the corresponding dependent value (Y-value) will be computed. The predicted value will be displayed in the text box; and a line (the green one as in above) will be drawn. Many predictions can be done and all the predicted values will be displayed to ease comparison. For the above example, if a project costs at $52K, the estimated staff size will be 53 persons; whereas for a project of $65K, the corresponding estimated staff size will be 66 persons.

The text box at the lower right hand corner displays all outputs of the statistical operations. To view all, press the scroll up and down at the right hand side of the text box. Examples of these outputs are provided in the following page.



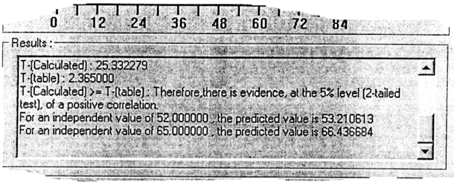
```
Number of Projects : 9
Correlation coefficient, r = 0.99459, indicating that there is a high positive correlation
between the two variables.
Correlation Coefficient : 0.994590
The intercept,a : 0.306333 & The slope,b : 1.017390
The linear regression equation is :
Y = 1.017390X + 0.306333
```

Screen C.14: A strong positive correlation between two variables



```
The linear regression equation is :
Y = 1.017390X + 0.306333
T-(Calculated) : 25.332279
T-(table) : 2.365000
T-(Calculated) >= T-(table) : Therefore,there is evidence, at the 5% level (2-tailed
test), of a positive correlation.
```

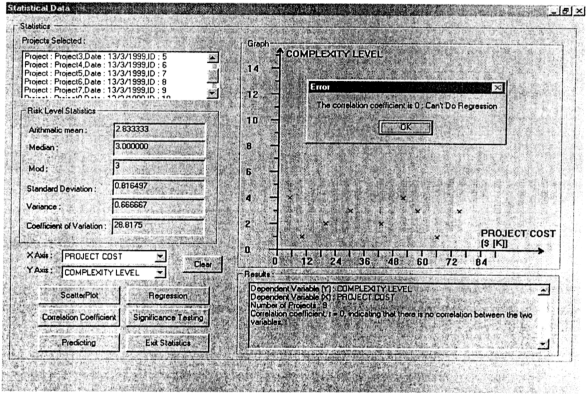
Screen C.15: Significance testing of the correlation.



T-(Calculated) : 25.332279
T-(table) : 2.365000
T-(Calculated) >= T-(table) : Therefore,there is evidence, at the 5% level (2-tailed test), of a positive correlation.
For an independent value of 52.000000 , the predicted value is 53.210613
For an independent value of 65.000000 , the predicted value is 66.436684

Screen C.16: Two corresponding predicted values for two independent variables.

This first portion (Screen C.14) of the statistical operations shows strong positive correlation between the two variables due to the high positive value of correlation coefficient, r. Regression equation is then computed. The second (Screen C.15) shows the significance of tested results, whereas the third (Screen C.16) displays the corresponding predicted values for two different independent variables.



Project : Project3,Date : 13/3/1999,ID : 5
Project : Project4,Date : 13/3/1999,ID : 6
Project : Project5,Date : 13/3/1999,ID : 7
Project : Project6,Date : 13/3/1999,ID : 8
Project : Project7,Date : 13/3/1999,ID : 9

Arithmatic mean : 2.833333
Median : 3.000000
Mod : 3
Standard Deviation : 0.816497
Variance : 0.666667
Coefficient of Variation : 28.8175

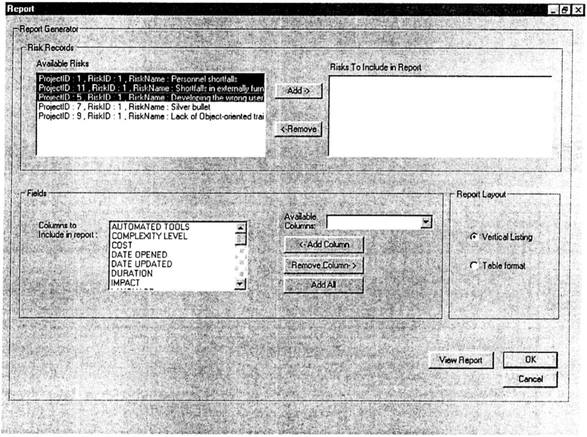
X Axis : PROJECT COST
Y Axis : COMPLEXITY LEVEL

The correlation coefficient is 0 : Can't Do Regression

Dependent Variable (Y) : COMPLEXITY LEVEL
Dependent Variable (X) : PROJECT COST
Number of Projects : 9
Correlation coefficient, r = 0, indicating that there is no correlation between the two variables.

Screen C.17: Correlation coefficient r = 0, indicating no correlation between two variables.

If an attempt is made to perform regression when the correlation coefficient r is equal to 0, a message box as depicted above appears. This is to indicate to the user that the tool is unable to perform further statistical operations because there is no correlation between the two selected variables. By clicking the **Exit Statistics** button, the user will exit to the main menu screen.



Available Risks

ProjectID : 1 , RiskID : 1 , RiskName : Personnel shortfalls
ProjectID : 11 , RiskID : 1 , RiskName : Shortfalls in externally furn
ProjectID : 5 , RiskID : 1 , RiskName : Developing the wrong user
ProjectID : 7 , RiskID : 1 , RiskName : Silver bullet
ProjectID : 9 , RiskID : 1 , RiskName : Lack of Object-oriented trai

Risks To Include in Report

Columns to Include in report :

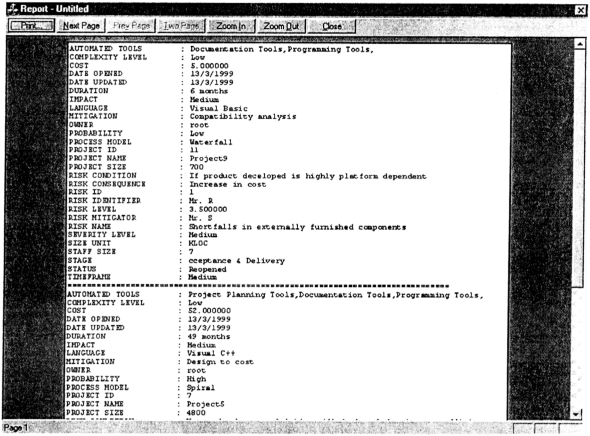
AUTOMATED TOOLS
COMPLEXITY LEVEL
COST
DATE OPENED
DATE UPDATED
DURATION
IMPACT

Available Columns:

● Vertical Listing
○ Table format

Screen C.18: Report dialog.

When a user clicks the **Report** button in the main menu screen, **Select Projects** screen (Screen C.9) as explained earlier appears. When the project(s) of interest is/are chosen, the above screen, Screen C.18, pops up. The user must now select from the available list of project fields to be included in the report. For greater flexibility, there are available two types of report layouts: **Vertical Listing** and **Table Format**. The Vertical Listing lists out the selected project fields in columnar format whereas the Table Format lists project fields as is displayed in database. The user can choose to view or/and to print the report.

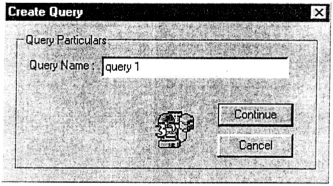


```
AUTOMATED TOOLS        : Documentation Tools,Programming Tools,
COMPLEXITY LEVEL       : Low
COST                   : 5.000000
DATE OPENED            : 13/3/1999
DATE UPDATED           : 13/3/1999
DURATION               : 6 months
IMPACT                 : Medium
LANGUAGE               : Visual Basic
MITIGATION             : Compatibility analysis
OWNER                  : root
PROBABILITY            : Low
PROCESS MODEL          : Waterfall
PROJECT ID             : 11
PROJECT NAME           : Project9
PROJECT SIZE           : 700
RISK CONDITION         : If product deceloped is highly platform dependent
RISK CONSEQUENCE       : Increase in cost
RISK ID                : 1
RISK IDENTIFIER        : Mr. R
RISK LEVEL             : 3.500000
RISK MITIGATOR         : Mr. S
RISK NAME              : Shortfalls in externally furnished components
SEVERITY LEVEL         : Medium
SIZE UNIT              : KLOC
STAFF SIZE             : 7
STAGE                  : cceptance & Delivery
STATUS                 : Reopened
TIMEFRAME              : Medium
=================================================================================
AUTOMATED TOOLS        : Project Planning Tools,Documentation Tools,Programming Tools,
COMPLEXITY LEVEL       : Low
COST                   : 52.000000
DATE OPENED            : 13/3/1999
DATE UPDATED           : 13/3/1999
DURATION               : 49 months
IMPACT                 : Medium
LANGUAGE               : Visual C++
MITIGATION             : Design to cost
OWNER                  : root
PROBABILITY            : High
PROCESS MODEL          : Spiral
PROJECT ID             : 7
PROJECT NAME           : Project5
PROJECT SIZE           : 4800
```

Screen C.19: A sample report in vertical listing format.

Screen C.19 is a sample vertical-listing format report in **Print Preview**. The report will exactly look like the above when printed. At Print Preview, the user has the flexibility to zoom in, zoom out, to see next page (if there is), to scroll up and down and to print. The page number is indicated at the lower left corner. To exit the preview window, click the **Close** or the close box (black X) in the upper right-hand corner of the window. If the user is not happy with the format as seen at the preview, he/she can choose **Edit** and alter the format manually. A name must be entered if a report is to be saved to a file.

The user can also perform copy/cut and paste to other applications.

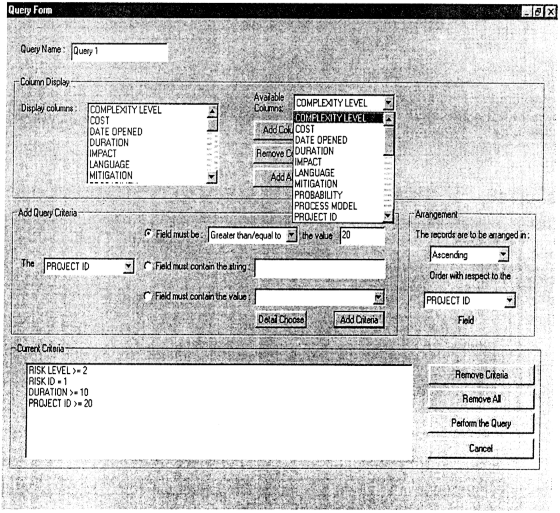


Query Particulars

Query Name: query 1

Screen C.20: A query dialog requesting query name from the user.

In the query module, a query name is required from user. The user has the flexibility to choose project fields to display in the query result. To make a more specific query, the user can add query criteria(s), i.e. the conditions for the query search. Depending on



Query Name: Query 1

Column Display

Display columns:
COMPLEXITY LEVEL
COST
DATE OPENED
DURATION
IMPACT
LANGUAGE
MITIGATION

Available Columns: COMPLEXITY LEVEL
COMPLEXITY LEVEL
COST
DATE OPENED
DURATION
IMPACT
LANGUAGE
MITIGATION
PROBABILITY
PROCESS MODEL
PROJECT ID

Add Query Criteria

The PROJECT ID

● Field must be: Greater than/equal to the value 20

○ Field must contain the string:

○ Field must contain the value:

Arrangement

The records are to be arranged in: Ascending

Order with respect to the PROJECT ID Field

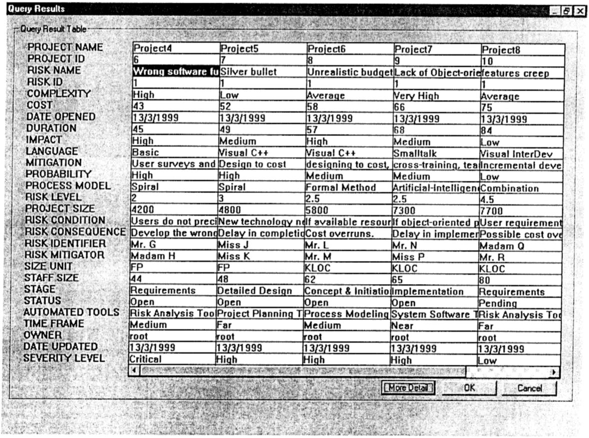
Current Criteria

RISK LEVEL >= 2
RISK ID = 1
DURATION >= 10
PROJECT ID >= 20

Screen C.21: Query setting dialog.

the selection of the field, a corresponding value has to be entered. In the above example, the **PROJECT ID** field corresponds to a numeric field, so the tool will only accept numeric numbers. For a criterion to be taken into account, **Add Criteria** button must be clicked once for each criteria to be added. To remove criteria(s), just highlight and click the **Remove Criteria** or **Remove All** buttons.

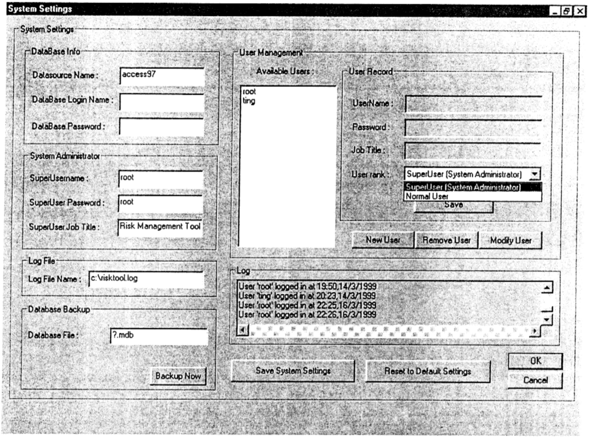
The user may request to arrange records in a specific manner: ascending, descending or not sorted (as in database order), with respect to a key (specified by the user). When everything is set, click the **Perform the Query** button to perform query.



PROJECT NAME	Project4	Project5	Project6	Project7	Project8
PROJECT ID	6	7	8	9	10
RISK NAME	Wrong software fu	Silver bullet	Unrealistic budget	Lack of Object-orie	features creep
RISK ID	1	1	1	1	1
COMPLEXITY	High	Low	Average	Very High	Average
COST	43	52	58	66	75
DATE OPENED	13/3/1999	13/3/1999	13/3/1999	13/3/1999	13/3/1999
DURATION	45	49	57	68	84
IMPACT	High	Medium	High	Medium	Low
LANGUAGE	Basic	Visual C++	Visual C++	Smalltalk	Visual InterDev
MITIGATION	User surveys and	Design to cost	designing to cost,	cross-training, tea	Incremental deve
PROBABILITY	High	High	Medium	Medium	Low
PROCESS MODEL	Spiral	Spiral	Formal Method	Artificial-Intelligen	Combination
RISK LEVEL	2	3	2.5	2.5	4.5
PROJECT SIZE	4200	4800	5800	7300	7700
RISK CONDITION	Users do not preci	New technology n	If available resour	If object-oriented p	User requirement
RISK CONSEQUENCE	Develop the wrong	Delay in completic	Cost overruns.	Delay in implemer	Possible cost ove
RISK IDENTIFIER	Mr. G	Miss J	Mr. L	Mr. N	Madam Q
RISK MITIGATOR	Madam H	Miss K	Mr. M	Miss P	Mr. R
SIZE UNIT	FP	FP	KLOC	KLOC	KLOC
STAFF SIZE	44	48	62	65	80
STAGE	Requirements	Detailed Design	Concept & Initiatio	Implementation	Requirements
STATUS	Open	Open	Open	Open	Pending
AUTOMATED TOOLS	Risk Analysis Too	Project Planning T	Process Modeling	System Software T	Risk Analysis To
TIME FRAME	Medium	Far	Medium	Near	Far
OWNER	root	root	root	root	root
DATE UPDATED	13/3/1999	13/3/1999	13/3/1999	13/3/1999	13/3/1999
SEVERITY LEVEL	Critical	High	High	High	Low

Screen C.22: A sample query

Screen C.22 shows a query example, sorted in an ascending order of Project ID field, and with a criteria cost > $40K. The user may view the cell items fully by clicking the **More Detail** button.



Datasource Name : access97

DataBase Login Name :

DataBase Password :

SuperUsername : root

SuperUser Password : root

SuperUser Job Title : Risk Management Tool

Log File Name : c:\risktool.log

Database File : ?.mdb

Available Users : root, ting

UserName :

Password :

Job Title :

User rank : SuperUser (System Administrator)

SuperUser (System Administrator)
Normal User

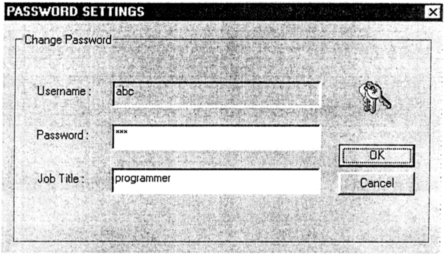
```
User 'root' logged in at 19:50,14/3/1999
User 'ting' logged in at 20:23,14/3/1999
User 'root' logged in at 22:25,16/3/1999
User 'root' logged in at 22:26,16/3/1999
```

Screen C.23: System Setting screen.

In the **System Setting** module, is shown the database information, data about administrator of the tool, log file, database backup file, user's logging track and user management.

To avoid loss of information, the user may set up a backup file for the database.

Two types of user levels are specified, i.e. the Superuser (system administrator) and the normal user. Only the superusers have access to the screen as shown above. Superusers have the option to alter not only data, he/she is also responsible to set up new user's accounts, to modify existing user's accounts information and to remove unwanted user's accounts. All users' log-in times and dates are tracked to further enforce the security of the tool.



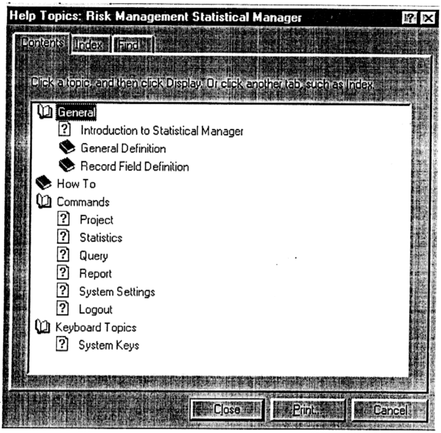
Username : abc

Password : ***

Job Title : programmer

Screen C.24: Change password dialog.

When an account has been set up for a normal user (username and password are assigned by the system administrator), he/she can log in to the tool. By clicking the **System Setting** button in the main menu, which is the first screen that displays when logged in, a second window will come up (Screen C.24). A normal user may change his/her password here. Every time after that the new password will be in effect.



Help Topics: Risk Management Statistical Manager

Click a topic, and then click Display. Or click another tab, such as Index.

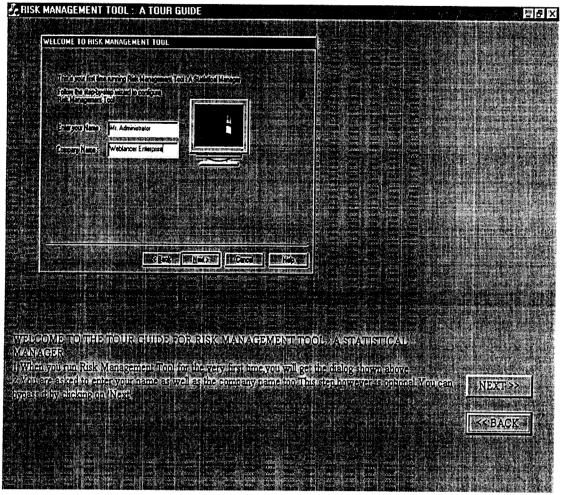
- General
  - Introduction to Statistical Manager
  - General Definition
  - Record Field Definition
- How To
- Commands
  - Project
  - Statistics
  - Query
  - Report
  - System Settings
  - Logout
- Keyboard Topics
  - System Keys

Screen C.25: Extract of the Help module.

A complete **HELP** facility comes with the tool. To get assistance, what a user needs to do is to click the **HELP** button in the main menu, or to press F1 at any time when the tool is active.

HELP provides complete and comprehensive information of the tool. As shown above, **GENERAL** information introduces the tool to the user, and defines all terms and record fields used in the tool. **HOW TO** provides explanation on how to create a project, set up user accounts, perform query, print reports and so on. **COMMANDS** provides explanations on functions of each of the buttons in the main menu.

KEYBOARD TOPICS informs the user on the available keyboard and shortcut keys that the user can use.


RISK MANAGEMENT TOOL : A TOUR GUIDE
WELCOME TO RISK MANAGEMENT TOOL
< Back
Next >
Cancel
Help
NEXT >>
<< BACK

This is your first time running Risk Management Tool : A Statistical Manager

Follow the step-by-step wizard to configure Risk Management Tool

Enter your Name : Mr. Administrator

Company Name : Weblancer Enterprise

WELCOME TO THE TOUR GUIDE FOR RISK MANAGEMENT TOOL, A STATISTICAL MANAGER

1 When you run Risk Management Tool for the very first time you will get the dialog shown above

2 You are asked to enter your name as well as the company name too This step however is optional You can bypass it by clicking on Next

Screen C.26: A Tour Guide extract.

To make the tool even friendlier, a Tour Guide is also available. The Tour Guide comes as a separate module. The user has the option to, or not to install this module for disk space reason. However, the Tour Guide is very useful, especially for the first time user. It provides a step-by-step guidance on setting up of the tool and its functions.

Appendix D: Evaluation Questionnaires

Question 1	To what extent do you understand the idea and concepts of this tool? □ 1-not at all □ 2-not quite □ 3-a little □ 4-fairly well □ 5-completely
Question 2	How good are the concepts of this tool relevant to risk management? □ 1-not good □ 2-not quite good □ 3-satisfactory □ 4-good □ 5-very good
Question 3	Is it easy to learn and use this tool? □ 1-very difficult □ 2-difficult □ 3-fairly easy □ 4-easy □ 5-very easy
Question 4	To what degree do you think this tool will support risk management practice in the context of software development? □ 1-not at all □ 2-not quite □ 3-a little □ 4-a lot □ 5-completely
Question 5	Do you find risk management supported by this tool more difficult or easier compared to conventional (manual) methods? □ 1-much more difficult □ 2-more difficult □ 3-same □ 4-easier □ 5-much easier

Question 6	Do you think that the information gathered in the database adequate to assist in decision making process? □ 1-not enough □ 2-not quite enough □ 3-more than enough □ 4-enough □ 5-just enough
Question 7	Do you encounter any problems in using the tool (e.g. were you able to perform desired task, did the tool crash?) □ 1-crashed continuously □ 2-crashed frequently □ 3-worked intermittently □ 4-worked well □ 5-worked perfectly
Question 8	How efficient/practical do you think the tool would be in real use? □ 1-very inefficient □ 2-inefficient □ 3-average □ 4-efficient □ 5-very efficient
Question 9	What general impression do you have of the tool? □ 1-very uninteresting/I didn't like □ 2-uninteresting □ 3-fairly good □ 4-interesting □ 5-very interesting/I liked
Question 10	Please rank the overall friendliness of this tool? □ 1-very unfriendly □ 2-unfriendly □ 3-acceptable □ 4-friendly □ 5-very friendly
Question 11	Which characteristics of the tool do you like?(you can tick more than one) □ Functions □ interfaces □ security □ statistics □ Database □ query □ report □ HELP/tour guide Please specify why: ______________________________ ____

Question 12	Which characteristics of the tool are inadequate and can be enhanced? (you can tick more than one) □ Functions □ interfaces □ security □ statistics □ Database □ query □ report □ HELP/tour guide Please specify why: ______________________________ ____

Table 6.1: Evaluator questionnaire.

Appendix E: Software Risk Management Guiding Principles, Myths, and FAQ

E.1 Succinct and useful risk management principles by Tom Gilb, 1988[31]

- If you don't actively attack risks, they will actively attack you.
- Never make promises you cannot keep, no matter what the pressure.
- If you do make any promises, make them yourself, and make them in writing.
- When you make a promise, include your estimate of how much deviation could occur for reasons outside of your control, for reasons within your control, and for reasons others in the company can control.
- When something happens during the project that you did not foresee, which increases deviation from planned risk, immediately raise the issue, in writing, with your constructive suggestion as to how to deal with it.
- If you suspect someone else – your boss or client – of assuming you have made promises, then take the time to disclaim them, and repeat the promises you have made, if any, in writing.
- When indicating possible deviation, make a list of the possible causes of deviation, as well as a list of the actions you could take to control these risks.
- Hang the following sign near your desk: "If you haven't got it in writing from me, I didn't promise it".
- If you don't ask for risk information, you are asking for trouble.

- The real professional is one who knows the risks, their degree, their causes, and the action necessary to counter them, and shares this knowledge with his colleagues and clients.
- Risk prevention is more cost-effective than risk detection.
- The degree of risk, and its causes, must never be hidden from decision-makers.
- Uncertainty in a technical project is half technical and half motivational, but with good enough motivation, uncertainty will not be allowed to lead to problems.

E.2 Guiding principles of resisting deadline pressure (by Tom Gilb, 1986) [10]

- ***The deadline mirage***. Rethink the deadline given to you – it may not be real.
- ***The solution mirage***. Rethink the solution handed to you – it may be in the way of on-time delivery.
- ***The other viewpoint***. Rethink the problem from other people's point of view – it will help you simplify your problem and convince them to agree with you.
- ***The expert trap***. Don't trust the experts blindly – they will cheerfully lead you to disaster. Be skeptical and insists on proof and guarantees.
- ***The all-at-once trap***. Remember nobody needs all of what they asked for by the deadline – they would simply like you to provide the miracle if possible.
- ***The real-needs principle***. Don't damage your credibility by bowing to pressure to make impossible promises. Increase you credibility by fighting for solutions that solve the real needs of your bosses and clients.
- ***The ends dictate the means***. If the deadline is critical and seems impossible otherwise – don't be afraid to change the solution.

- ***The principle of conservation of energy***. If deadlines are critical, make maximum use of existing system and “known technology” – avoid research-into-unknowns during your project.
- ***The evolutionary delivery principle***. Any large project can be broken down into a series of earlier and smaller deliverables – don’t give up – even if you have to change the technical solution to make it happen. Keep your eyes on result – not technologies.
- ***The “don’t blame me” principle***. If you succeed using these principles, take the credit -—give your boss and these ideas some credit in a footnote. If you fail – you obviously didn’t apply these principles correctly (don’t mention my name; mention your boss’s if you must blame somebody. Management is always at fault.)

E.3 Software Risk Management FAQ

❖ *What is risk management?*

Software Risk Management is practice with processes, methods, and tools for managing risks in a project. It provides a disciplined environment for proactive decision making to

- assess continuously what could go wrong (risks)
- determine which risks are important to deal with
- implement strategies to deal with those risks

The objectives of risk management are to identify, address, and reduce/eliminate risk items before they become either threats to successful software development or major sources of software rework.

❖ *What is Risk Analysis?*

Risk analysis, in a broader sense, is any method, quantitative and/or qualitative, for assessing the impacts of risks on decision situations.

❖ *Why is there pressure to do risk management?*

The pressure to improve project performance, time to market, reduce costs, and improve management practices is driving organizations to avoid expensive problems, hence to more effectively manage risk.

Accurate identification and analysis of risks is fundamental to effective project and organization management. Organizations need to move swiftly in today's market, with no time wasted on problems they can anticipate as risks.

- ***What will risk management do for my business?***

  There will be a cultural shift from "fire-fighting" and "crisis management" to proactive decision making that avoids problems before they arise. Anticipating what might go wrong will become a part of everyday business, and the management of risks will be as integral to program management as problem or configuration management.

- ***What are the consequences or negative results of not doing risk management?***

  Management will not have insight into what could go wrong – consequently more resources will be spent correcting problems that could have been avoided earlier. Catastrophic problems (surprises) may occur without warning (and with no recovery possible), decisions will be made without complete information or adequate knowledge of future consequences, the overall probability of successful completion of the program is reduced, and your program will always be in a crisis.

- ***If I implement risk management, does that guarantee success?***

  No. There are many aspects to achieving program success. Risk management is not a silver bullet. However, it can improve decision making, help avoid surprises, and improve your chances of succeeding.

E.4 Software Risk Management Myths

- ***Myth: Software risk management is difficult to implement.***

  With the right tools, software risk management is a natural part of project activities.

- ***Myth: Software risk assessment is expensive and time consuming.***

  With the right tools and right techniques, software risk assessment can be conducted quickly, easily, and at a small fraction of the overall project cost.

- ***Myth: My project is too small to use software risk management.***

  Software project of all sizes can benefit from actions to reduce project risks.

- ***Myth: Software risk management will give me more work.***

  Software risk management will give you less work, by focusing efforts on the highest-impact areas and eliminating "fire-fighting" work by eliminating "fires" before they happens.

- ***Myth: Software risk assessment tells me what is wrong with my project.***

  Through software risk assessment, you will learn your project's strengths, and key areas to improve execution.

- ***Myth: Software risk management is only needed on projects that are "in trouble".***

  All projects will be in trouble without effective risk management.

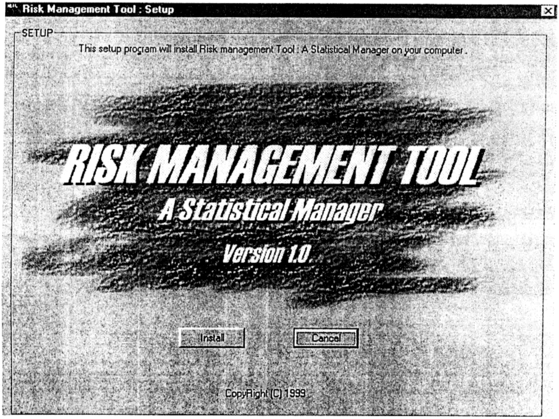
- ***Myth: Software risk management is just another bureaucratic "process".***

  Software risk management is one of the most powerful, action-oriented approaches in the practice of software project management.

Appendix F: Installation Guide

The copy of the Risk Management Tool: A Statistical Manager software is available in the CD. It is an auto run version on CD. To install on your computer, proceed as follows:

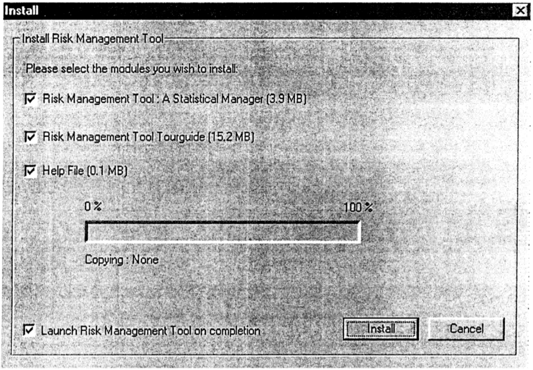
1. Close any opened applications so that only Windows is running.
2. Insert the Statistical Manager CD into the CD-ROM drive. In a few seconds, Screen F.1 below will be displayed.
3. To proceed, press the **Install** button.



This setup program will install Risk management Tool : A Statistical Manager on your computer .

Screen F.1: Risk Management Tool setup screen.

4. The installation screen below (Screen F.2) appears.



Install

Install Risk Management Tool

Please select the modules you wish to install:

☑ Risk Management Tool : A Statistical Manager (3.9 MB)

☑ Risk Management Tool Tourguide (15.2 MB)

☑ Help File (0.1 MB)

Copying : None

☑ Launch Risk Management Tool on completion

Screen F.2: Installation screen

5. There are three separate modules.

    I. Risk Management Tool main program.

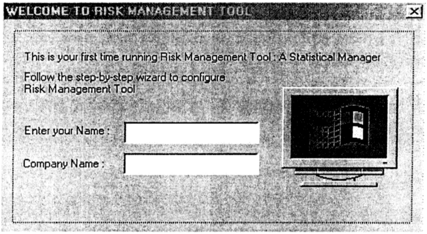
    II. Tour Guide.

    III. Help File

    The parentheses immediately following the modules indicate the disk spaces required for each individual module.

6. Check the box of your desired module. Each of the modules can run independently. For full installation, check all the checkboxes.
7. Press the **Install** button once this is done. The progression bar indicates the percentage of installation.
8. To exit without installing, press the **Cancel** button.

9. Screen F.3 below will appear when you run this tool for the first time. Type in your name and your company's name. However, you may bypass this step by pressing Enter or Esc key on the keyboard.



WELCOME TO RISK MANAGEMENT TOOL

This is your first time running Risk Management Tool : A Statistical Manager

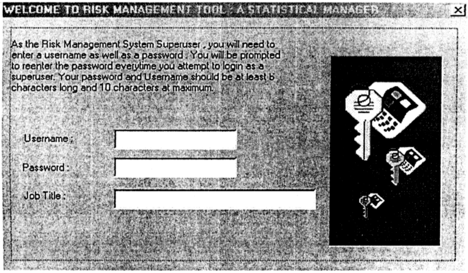
Follow the step-by-step wizard to configure
Risk Management Tool

Enter your Name :

Company Name :

Screen F.3: Owner registration dialog.

10. The next step is to enter the superuser (tool administrator) name, the password and the job title (as shown in Screen F.4). It is very important that you remember this password. There is no way to retrieve this password once you have forgotten it, except to open the database itself, or to reconstruct the entire security system.



WELCOME TO RISK MANAGEMENT TOOL : A STATISTICAL MANAGER

As the Risk Management System Superuser , you will need to enter a username as well as a password . You will be prompted to reenter the password everytime you attempt to login as a superuser. Your password and Username should be at least 6 characters long and 10 characters at maximum.

Username :

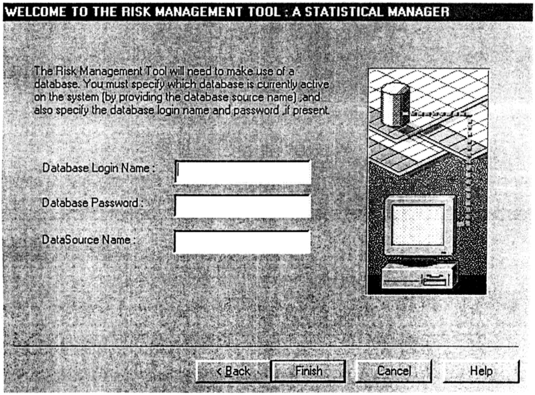
Password :

Job Title :

Screen F.4: Superuser's login screen

The superuser's name that you entered will be the most powerful user of the tool. He/she has access to all and every other user's projects and the sole authority to modify any of them. It is also his/her job to setup other user accounts.

11. The following steps are crucial to ensure that the database source is configured correctly. If you fail to enter correct database particulars, you will not be able to use this tool, until you have supplied the correct information.
12. Enter the correct **Data Source** name. If **Database Login Name** and **Password** are also present, you must also enter them correctly, as shown in Screen F.5. Click the **Finish** button to proceed. If everything is entered correctly, you will see the login screen (see Screen F.11) of the tool.
13. If there is no active database source yet, or if you wish to use other type of database other than the existing one, follow steps 14 - 23.



WELCOME TO THE RISK MANAGEMENT TOOL : A STATISTICAL MANAGER

The Risk Management Tool will need to make use of a database. You must specify which database is currently active on the system (by providing the database source name) ,and also specify the database login name and password ,if present.

Database Login Name :

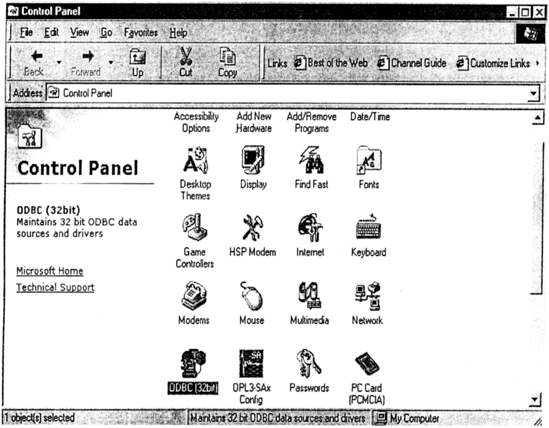
Database Password :

DataSource Name :

Screen F.5: Data source name and database login screen.

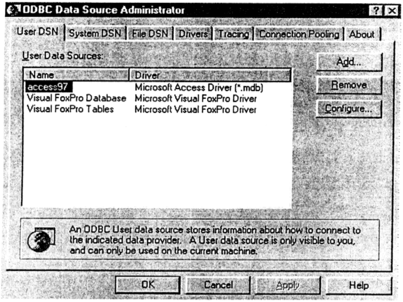
14. To set up a database, the first step is to go to the **Start** button at the toolbar of WIN 95/97/98. Click **Settings** and choose **Control Panel.**

15. You should be able to locate an icon named **ODBC 32 bit** (the highlighted one as shown in Screen F.6). If you don't, you need to install this software first. Double click at this icon.



Screen F.6: ODBC 32 bit in Control Panel.

16. You should get a screen similar to Screen F.7 as shown in the following page. Look for the database you plan to use in the **User Data Sources** list box. This guide will only show you how to configure your computer for the Microsoft Access 97 driver.



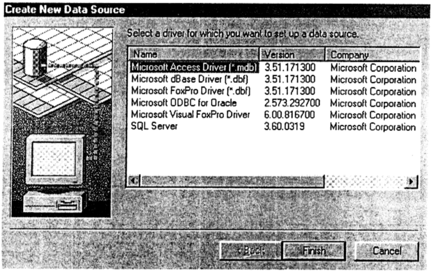
User Data Sources:

Name	Driver
access97	Microsoft Access Driver (*.mdb)
Visual FoxPro Database	Microsoft Visual FoxPro Driver
Visual FoxPro Tables	Microsoft Visual FoxPro Driver

An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only visible to you, and can only be used on the current machine.

Screen F.7: ODBC data source administration dialog.

17. If you cannot find the driver 'Microsoft Access Driver (*.mdb)', as in Screen F.7, then you should click the **Add** button to add that driver, as shown in Screen C.8 below.



Select a driver for which you want to set up a data source.

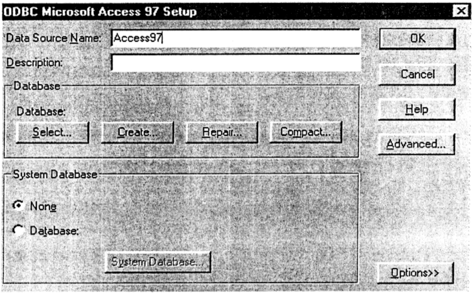
Name	Version	Company
Microsoft Access Driver (*.mdb)	3.51.171300	Microsoft Corporation
Microsoft dBase Driver (*.dbf)	3.51.171300	Microsoft Corporation
Microsoft FoxPro Driver (*.dbf)	3.51.171300	Microsoft Corporation
Microsoft ODBC for Oracle	2.573.292700	Microsoft Corporation
Microsoft Visual FoxPro Driver	6.00.816700	Microsoft Corporation
SQL Server	3.60.0319	Microsoft Corporation

Screen F.8: Adding new database driver to User Data Sources list.

18. Once you have done that, you should see that driver listed in the **User Data Sources** list box.

19. Highlight the name corresponding to the "Microsoft Access Driver', in this example it is access 97. Click the **Configure** button (Screen F.7).

20. You should now see a screen similar to Screen F.9 below. Your data source name will appear here.



Data Source Name: Access97

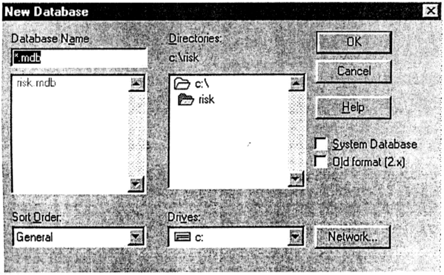
Description:

● None

○ Database:

Screen F.9: ODBC Microsoft Access 97 setup dialog.

21. In the **Database** section, create a new database file by clicking the **Create** button. Make sure the database file is in the same directory as that of your tool. You can type in any name for the .mdb file in the dialog that follows.



Database Name: *.mdb

risk.mdb

Directories: c:\risk

☐ System Database

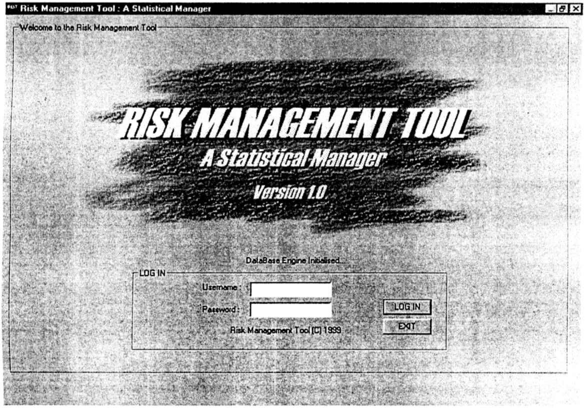
☐ Old format (2.x)

Sort Order: General

Drives: c:

Screen F.10: Creating Microsoft Access database file.

22. You should also click the **Advanced** button (Screen F.9) to check your database login name and password. It is advisable to set these to empty.
23. Click the **OK** button to proceed.
24. Now you have successfully set up your database source. Supply this information to Risk Management Tool.
25. Click the **Finish** button (Screen F.5). You should get this login screen as shown in Screen F.11. If an error message still pops up, you should check your database settings again, through the ODBC 32 bit.


Risk Management Tool : A Statistical Manager
Welcome to the Risk Management Tool
RISK MANAGEMENT TOOL
A Statistical Manager
Version 1.0
DataBase Engine Initialised...
LOG IN
Username :
Password :
LOG IN
EXIT
Risk Management Tool [C] 1999

Screen F.11: Risk Management Tool login screen.

26. Enter your superuser name and password to log in to the tool. Once you have passed this, you will see the main menu screen of the tool, where you will be able to start using it.

27. The fastest way to begin learning about Statistical Manager is by using the Tour Guide. This guide provides a brief overview of the tool's capabilities, and detailed descriptions of the key functions.