SOEN 6611

Software Measurement

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Deliverable 1

METRICSTICS

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Chapter 1

Problem 1

1.1 SMART GOAL

Goal: **Develop a highly responsive system METRICSTICS to enhance user satisfaction and efficiency.**

Purpose
To achieve the response time of METRICSTICS in milliseconds in order to provide users with quicker access to data and improve their overall efficiency.

Perspective
Examine system responsiveness from the viewpoint of METRICSTICS users and stakeholders who rely on timely access to data.

Environment
In the context of the METRICSTICS software environment, encompassing the software infrastructure, user base, and the device users use.

The provided goal satisfies all the SMART criteria:

- **Specific:** The goal is specific and clearly outlines what needs to be achieved - developing a highly responsive system called METRICSTICS to enhance user satisfaction and efficiency. It specifies the desired outcome and purpose of the project.
- **Measurable:** The goal includes a measurable metric: the response time of METRICSTICS in milliseconds. This allows for quantifiable progress tracking and evaluating whether the goal has been met.
- **Attainable:** The goal is realistic and achievable. It doesn't set unrealistic expectations or require resources that are not available. It focuses on achieving the system's performance.
- **Realistic:** The goal is relevant and rational. It directly addresses the need to improve user satisfaction and efficiency by targeting the system's response time, which is a critical factor for user experience.
- **Timely:** The specified goal defines the response time, adding a sense of urgency and providing a clear deadline for the goal i.e., not more than 1-2 months.

1.2 QUESTIONS AND METRICS

10 QUESTIONS related to the defined GOAL and METRICS that will help answer those questions.

Question 1: How do users perceive the overall system responsiveness of METRICSTICS to be, and how can we measure their satisfaction accurately?
Metrics:

- User Feedback on System Responsiveness expectations while performing calculations. This can be gathered through surveys or interviews.
- User Ratings of System Responsiveness on a Scale of 1-5.

Question 2: What can be the most common performance bottlenecks in METRICSTICS, and how can we address them?
Metrics:

- Identification of Performance Bottlenecks that can be tracked through performance monitoring tools like Grafana or Datadog.
- Time Spent on Specific Operations like clicking the "CALCULATE" button for the standard deviation and the result displayed on screen (before and after optimizations).

Question 3: What is the expected impact of improved response time on user productivity within METRICSTICS?
Metrics:

- User Task Completion Time (before and after improvements).
- User Adoption Rates of METRICSTICS Features by measuring increased usage of the system.

Question 4: How often should we conduct performance testing and optimizations to maintain an acceptable level of system responsiveness in METRICSTICS?
Metrics:

- Frequency of Performance Testing Sessions.
- Time Between Performance Optimization Cycles.

Question 5: How can we reduce the loading time for METRICSTICS dashboards and reports?
Metrics:

- Average Dashboard Loading Time (before and after improvements).
- User Satisfaction with Dashboard Loading Speed that can be measured through beta testing, surveys or feedback.

Question 6: What is the user tolerance threshold for response time in METRICSTICS, and how can we align our improvements with these expectations?
Metrics:

- User-Defined Response Time Tolerance (gathered through surveys or interviews).
- Percentage of Users Satisfied with Response Time.

Question 7: Will there be specific peak usage times or events when METRICSTICS experiences performance issues, and how can we prepare for them?
Metrics:

- Performance Metrics During Peak Usage Times.
- User Feedback on Performance During Peak Events.

Question 8: What is the impact of network latency on METRICSTICS' response time, and how can we mitigate this effect?
Metrics:

- Network Latency Measurements (before and after optimizations) using tools like Wireshark or SolarWinds.
- User Feedback during beta testing on the frequency Network-Related Performance Issues.

Question 9: What are the resource utilization patterns during high-load periods in METRICSTICS, and how can we optimize resource allocation for improved response time?
Metrics:

- Resource Utilization Data (CPU, memory, etc.) During High-Load Periods through monitoring tools like Grafana, DataDog, Nagios, etc.
- Resource Utilization Efficiency Improvements (e.g., reduced CPU usage per request).

Question 10: Are there specific browsers that experience slower performance in METRICSTICS, and how can we optimize for them?
Metrics:

- Performance Benchmarking on Different web Browsers like Microsoft Edge, Google Chrome, and Mozilla Firefox.
- User Feedback on Browser-Specific Performance (gathered through surveys or feedback during beta testing).

Chapter 2

Problem 2

2.1 USE CASE MODEL FOR METRICSTICS

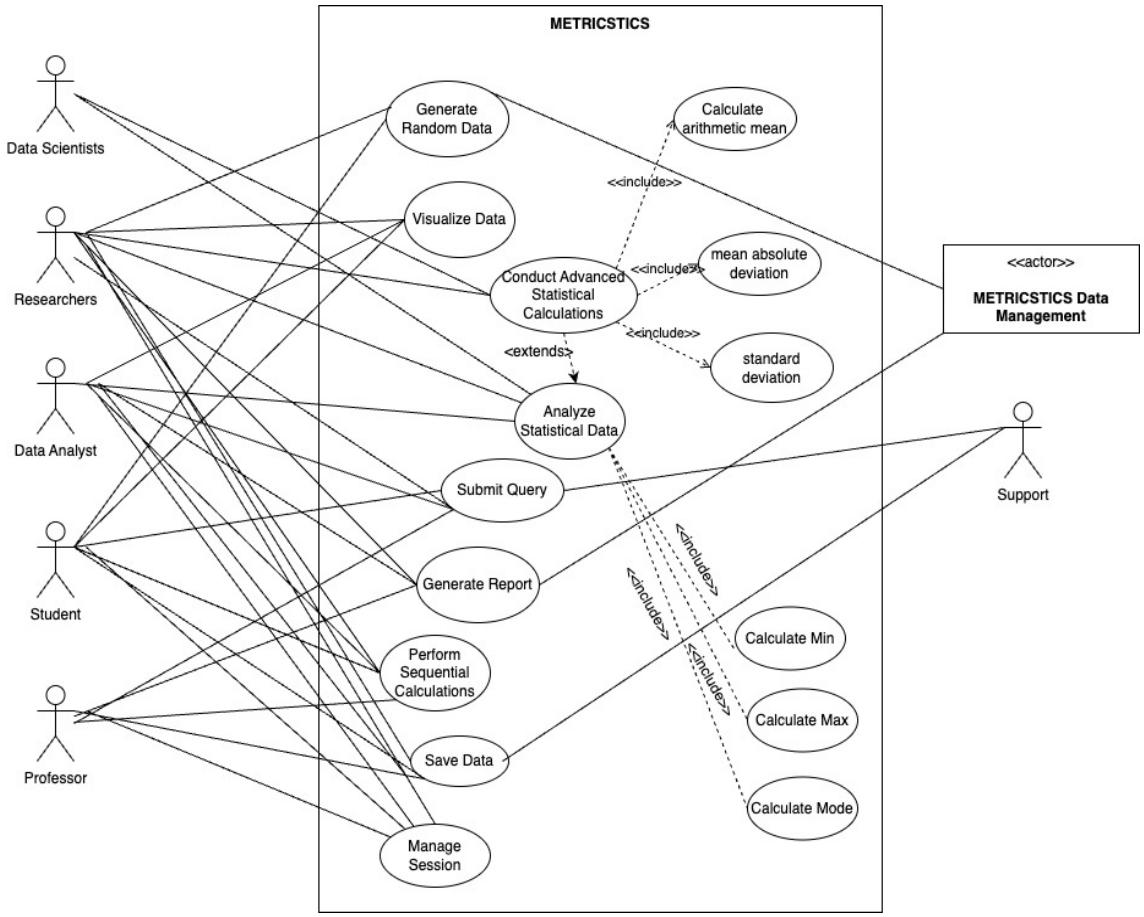

Figure 2.1: Use Case Model for METRICSTICS

2.2 USE CASE DESCRIPTION

A use case is a set of steps that are required to accomplish a specific task or goal. A use case can have multiple paths to reach the goal; each of them is considered a use case scenario. In simple words, a use case is a goal with various processes, and a case scenario represents a linear and straight path through one of the operations.

Here we have represented the user description for the use case of **METRICSTICS.**

System	METRICSTICS
Identifier	UC001
Author(s)	Dvij Barot
Version	1.0
Priority	High
Name	Analyze Statistical Data
Pre-Condition(s)	1. User has access to METRICSTICS. 2. User has input valid data.
Post-Condition(s)	System generates and presents comprehensive reports summarizing standard and advanced statistical analysis results.
Trigger	User selects the option to perform statistical analysis and reporting.
Normal Flow	1. User selects the "Perform Analysis" option in METRICSTICS. 2. METRICSTICS calculates and displays standard statistical measures, including minimum, maximum, mode, and median. 3. The system also performs advanced statistical analysis, such as regression analysis, hypothesis testing, and machine learning algorithms, as requested. 4. Users have the option to customize the level of detail or specific statistics they want to see, including advanced analysis results. 5. METRICSTICS generates comprehensive reports summarizing both standard and advanced statistical analysis results. 6. Users can choose to save or export the advanced analysis reports for further research and presentation purposes.
Exceptional Flow(s)	• **EF1:** If the user's input data contains missing values or outliers, the system could handle these by providing options for data preprocessing, such as imputation or outlier detection. • **EF2:** In case the user's selected advanced statistical analysis method requires specific assumptions (e.g., normal distribution), the system could check for these assumptions and guide the user on how to proceed if they are not met.
Related Actor(s)	User, Data Scientists, Researchers, Data Analysts
Related Use Case	Generate Reports, Calculate minimum, maximum, mode, median, arithmetic mean, mean absolute deviation and standard deviation

Table 2.1: Use Case Description for Statistical Analysis and Reporting

System	METRICSTICS
Identifier	UC002
Author(s)	Dvij Barot
Version	1.0
Priority	High
Name	Conduct Advanced Statistical Calculations
Pre-Condition(s)	1. User has access to METRICSTICS. 2. User has input valid data.
Post-Condition(s)	Users successfully perform advanced statistical calculations using METRICSTICS for research and data analysis.
Trigger	Users access the "Advanced Calculations" feature within METRICSTICS.
Normal Flow	1. Users, including Data Scientists and Researchers, access the "Advanced Calculations" feature within METRICSTICS. 2. METRICSTICS provides a range of advanced statistical methods and algorithms for selection. 3. Users choose the desired statistical method and input the relevant data, including complex datasets. 4. The system executes the advanced calculation and presents the results, including detailed outputs and visualizations. 5. Users can fine-tune parameters, compare multiple calculations, and use advanced modeling features within the same session. 6. Calculations are saved for future reference or used in advanced research projects.
Exceptional Flow(s)	• **EF1:** If the selected advanced statistical calculation requires a substantial amount of computing resources, the system should handle this by optimizing performance or providing feedback on expected execution time. • **EF2:** In the case of user input errors in specifying advanced statistical parameters, the system should provide clear error messages and guidance for correction.
Related Actor(s)	Data Scientists, Researchers
Related Use Case	Perform Statistical Calculations

Table 2.2: Use Case Description for Advanced Statistical Calculations

System	METRICSTICS
Identifier	UC003
Author(s)	Dvij Barot
Version	1.0
Priority	High
Name	Visualize Data
Pre-Condition(s)	1. User has access to METRICSTICS. 2. User has input valid data.
Post-Condition(s)	Users successfully generate and view data visualizations.
Trigger	User selects the option to perform data visualization.
Normal Flow	1. User selects the "Data Visualization" option in METRICSTICS. 2. METRICSTICS provides a range of visualization types (e.g., bar charts, Line graphs, etc). 3. Users choose the desired visualization type and specify the data to be visualized. 4. METRICSTICS generates the visualization and presents it to the user. 5. Users can customize the visualization's appearance, labels, and other attributes. 6. The user reviews the generated visualization to ensure it accurately represents the data. 7. Users have the option to save, export, or share the visualization as required.
Exceptional Flow(s)	None
Related Actor(s)	Data Analysts, Researchers, Students
Related Use Case	None

Table 2.3: Use Case Description for Data Visualization

System	METRICSTICS
Identifier	UC004
Author(s)	Nishant Arora
Version	1.0
Priority	High
Name	Generate Random Data
Pre-Condition(s)	1. User has access to METRICSTICS. 2. User specifies the number of data points and the range.
Post-Condition(s)	System generates and uses artificial data for calculations.
Trigger	User selects the option to generate random data.
Normal Flow	1. User specifies the number of data points and the range. 2. METRICSTICS generates random data based on the user's specifications. 3. User proceeds with further analysis using the generated data.
Exceptional Flow(s)	None
Related Actor(s)	Student, Researcher
Related Use Case	None

Table 2.4: Use Case Description for Generate Random Data

System	METRICSTICS
Identifier	UC005
Author(s)	Nishant Arora
Version	1.0
Priority	Medium
Name	Generate Report
Pre-Condition(s)	Descriptive statistics have been calculated.
Post-Condition(s)	System generates a detailed CSV report with all relevant statistic calculations.
Trigger	User click on the generate report button.
Normal Flow	1. User requests to view the descriptive statistics report. 2. METRICSTICS downloads a CSV report with calculated statistics.
Exceptional Flow(s)	None
Related Actor(s)	Researcher, Professor, Data Analyst
Related Use Case	None

Table 2.5: Use Case Description for Generate Report

System	METRICSTICS
Identifier	UC006
Author(s)	Poojitha Bhupalli
Version	1.0
Priority	Medium
Name	Perform Sequential Calculations
Pre-Condition(s)	1. User has uploaded a dataset. 2. User has selected statistical measures. 3. METRICSTICS is operational and accessible.
Post-Condition(s)	1. Sequential calculations are performed on the dataset. 2. Results are displayed for user review. 3. User can choose to save or export the sequential calculations.
Trigger	User selects the option to perform sequential calculations after the initial calculations have been completed.
Normal Flow	1. User selects the option to perform sequential calculations after reviewing the initial descriptive statistics. 2. METRICSTICS prompts the user to choose additional statistical measures or modify the existing ones. 3. User selects the additional statistical measures to be calculated. 4. METRICSTICS performs sequential calculations on the same dataset based on the new selections. 5. Results of the sequential calculations are displayed to the user. 6. User reviews the results and decides to save, export, or perform further calculations.
Exceptional Flow(s)	• **Error in selection:** If the user selects an invalid statistical measure, METRICSTICS displays an error message and prompts the user to select a valid measure. • **No data available:** If the user attempts to perform sequential calculations without uploading a dataset, METRICSTICS displays an error message and prompts the user to upload data. • **System Unavailable:** If METRICSTICS is temporarily unavailable due to maintenance or technical issues, the use case cannot be executed, and the user is notified about the unavailability.
Related Actor(s)	Student, Researcher, Professor, Data Analyst
Related Use Case	Conduct Advanced Statistical Calculations

Table 2.6: Use Case Description for Perform Sequential Calculations

System	METRICSTICS
Identifier	UC007
Author(s)	Papry Barua
Version	1.0
Priority	Medium
Name	Save Data
Pre-Condition(s)	1. User has access to METRICSTICS. 2. The user must initiate the "Save Data" function through the user interface of the calculator, typically after performing a statistical calculation or analysis.
Post-Condition(s)	System generates and uses artificial data for calculations.
Trigger	User selects the option to generate save data.
Normal Flow	1. The user performs a statistical calculation or analysis using the statistical calculator. 2. After reviewing the results or data, the user decides to save it for future reference or analysis. 3. The user interacts with the "Save Data" feature within the statistical calculator. 4. The system presents options for the user to specify the name of the file, the storage location, and the file format (e.g., CSV, Excel, text file). 5. The user provides the necessary details and confirms the save operation. 6. The statistical calculator saves the data or results to the specified location in the chosen format.
Exceptional Flow(s)	None
Related Actor(s)	Student,Researcher,Professor,Data Analyst
Related Use Case	None

Table 2.7: Use Case Description for Save Data

System	METRICSTICS
Identifier	UC008
Author(s)	Shivangi Arul
Version	1.0
Priority	Low
Name	Submit Query
Pre-Condition(s)	1. Users must be logged into the METRICSTICS platform. 2. The METRICSTICS platform should be operational and free from technical issues that would prevent query submission. 3. The METRICSTICS Help System should be accessible and functioning.
Post-Condition(s)	1. Users have successfully submitted their queries or requests for assistance within the METRICSTICS platform. 2. The METRICSTICS platform should be operational and free from technical issues that would prevent query submission. 3. The METRICSTICS Help System has acknowledged the query and is processing it. 4. Undergraduate and graduate students may receive responses, guidance, or solutions based on their submitted queries. 5. Users can continue using the platform or explore additional help options as needed after submitting their queries.
Trigger	When a user on the METRICSTICS platform needs assistance or information on a specific aspect of the platform and decides to submit a query or request for help.
Normal Flow	1. A user on the METRICSTICS platform needs assistance or information on a specific aspect of the platform. 2. Users access the "Submit Query" section within the METRICSTICS platform. 3. The system prompts the user to specify the nature of their query or request. 4. The user provides details regarding their query, such as the specific topic or issue they need help with. 5. The METRICSTICS Help System acknowledges the query and begins processing it. 6. Undergraduate or graduate students may receive responses, guidance, or solutions based on their submitted queries. 7. After submitting their queries, users can continue using the platform or explore additional help options as needed.
Exceptional Flow(s)	None
Related Actor(s)	Student,Researcher,Professor,Data Analyst
Related Use Case	None

Table 2.8: Use Case Description for Submit Query

System	METRICSTICS
Identifier	UC009
Author(s)	Poojitha Bhupalli
Version	1.0
Priority	High
Name	Manage Sessions
Pre-Condition(s)	User has successfully logged into METRICSTICS.
Post-Condition(s)	User's session state and data are effectively managed.
Trigger	User selects the "Session Management" option in the METRICSTICS interface.
Normal Flow	1. User selects the "Save Session" option. • System prompts the user to provide a session name for identification. • User enters a unique session name and confirms the save operation. • METRICSTICS saves the current state of the session, including selected data, variables, and performed operations, associating it with the provided session name. 2. User continues with further analysis or chooses to end the session. • User performs various operations such as visualization within the session. • If the user decides to end the session, they select the "End Session" option. • METRICSTICS clears the current session data and variables, freeing up system resources. 3. User selects the "Load Session" option in a subsequent session. • The system displays a list of saved sessions for users to choose from, and METRICSTICS restores the session, including data, variables, and operations, allowing users to continue analysis.
Exceptional Flow(s)	• **Session save failure:** If there is a failure in saving the session data (e.g., due to storage limitations), METRICSTICS displays an error message and prompts the user to retry or contact support. • **Session load failure:** If the saved session data is corrupted or incomplete, METRICSTICS displays an error message and prompts the user to choose a different session or start a new one. • **Session deletion:** User selects the "Delete Session" option. METRICSTICS prompts the user to confirm the deletion. If confirmed, the selected session is permanently deleted from the system.
Related Actor(s)	Student, Researcher, Professor, Data Analyst
Related Use Case	Data Visualization, Save Data

Table 2.9: Use Case Description for Session Management

Chapter 3

Tasks Allocation

All the members of the team shared equal responsibilities throughout Deliverable 1 of the project. However, each one of us is assigned multiple problems and will be working on them for which each of us is primarily responsible. For the other problems, we would be sharing our insights based on our research and overall understanding of concepts.

Members	**Individual Tasks & Responsibilities**
Nishant Arora	**Problem 1:** Preparing 2 Goal Specific Questions(1,2) **Problem 2:** Created 2 Use Case Descriptions (UC004 & UC005) Developed Use Case Diagram
Shivangi Arul	**Problem 1:** Preparing 2 Goal Specific Questions(3,9) **Problem 2:** Created 1 Use Case Description (UC008) Designed LaTeX documentation
Dvij Barot	**Problem 1:** Preparing 2 Goal Specific Questions(4,5) **Problem 2:** Created 3 Use Case Descriptions (UC001,UC002 & UC003) Developed Use Case Diagram
Papry Barua	**Problem 1:** Preparing 2 Goal Specific Questions(6,7) **Problem 2:** Created 1 Use Case Description (UC007) Designed LaTeX documentation
Poojitha Bhupalli	**Problem 1:** Preparing 2 Goal Specific Questions(8,10) **Problem 2:** Created 2 Use Case Descriptions (UC005, UC009) Designed LaTeX documentation

Before starting on any problem,

- We have a formal brainstorming session.
- Ensure each one of us contributes our key ideas.
- Work on our respective tasks.
- Discuss issues we encounter on a daily basis.
- Share feedback before we proceed with our tasks.

Chapter 4

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