# **Software Requirements Specification (SRS)**

**For  
Crash Data Analysis Project (2003–2015 Crashes)**

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## **1. Introduction**

### **1.1 Purpose**

The purpose of this document is to define the software requirements for the Crash Data Analysis system, focusing on traffic accident data from 2003 to 2015. The system provides a comprehensive platform for visualizing, analyzing, and generating reports based on this crash data to help users better understand accident patterns and their implications for public safety.

### **1.2 Document Conventions**

* Requirements that are essential are marked as **high priority**.
* Glossary terms are **bolded**.
* References to external documents follow standard citation practices.

### **1.3 Intended Audience and Reading Suggestions**

The intended audience includes project stakeholders, developers, testers, and data analysts. Stakeholders interested in system functionality should review Sections 3 and 4, while developers may focus on Section 4 for specific requirements. Testers will benefit from a thorough review of Section 5.

### **1.4 Product Scope**

The Crash Data Analysis system provides tools to upload, analyze, and report on traffic accident data from 2003 to 2015. Its key objective is to help government agencies, research institutions, and public safety organizations analyze crash trends to make informed decisions for improving road safety.

### **1.5 References**

* IEEE Std 830-1998 IEEE Recommended Practice for Software Requirements Specifications.
* "Crash Data 2003-2015" Excel File.

## **2. Overall Description**

### **2.1 Product Perspective**

This Crash Data Analysis system is a standalone web-based tool designed for analyzing historical crash data. It allows users to perform data analysis without predictive modeling. Users can filter data, generate visual reports, and export the results.

### **2.2 Product Functions**

The key functions of the system include:

* Data upload from structured formats like CSV or Excel.
* Filtering crash data by parameters such as date range, crash type, and location.
* Visualizing data using charts and graphs.
* Generating reports summarizing crash trends.
* Exporting reports in PDF, Excel, and CSV formats.

### **2.3 User Classes and Characteristics**

* **Administrator:** Manages data uploads, system settings, and user roles.
* **Data Analyst:** Analyzes crash data and generates reports for deeper insights.
* **General User:** Accesses data visualizations and pre-generated reports.

### **2.4 Operating Environment**

* **Frontend:** Accessible via any modern web browser (e.g., Chrome, Firefox, Edge).
* **Backend:** A server-based system using a relational database (e.g., MySQL, PostgreSQL).

### **2.5 Design and Implementation Constraints**

* Must handle large datasets efficiently.
* Compliance with data privacy and security regulations is mandatory.

### **2.6 User Documentation**

* A user manual will provide instructions for data uploads, analysis, and report generation.
* Online tutorials will be available to walk users through system functionality.

### **2.7 Assumptions and Dependencies**

* Data uploads will always follow a structured format (CSV, Excel).
* Stable internet connectivity is assumed for accessing the web-based platform.

## **3. External Interface Requirements**

### **3.1 User Interfaces**

* **Dashboard:** Provides access to data filters, summary statistics, and data upload options.
* **Visualization Interface:** Displays charts and graphs for data analysis.
* **Report Generation Interface:** Allows users to create and download reports based on their analysis.

### **3.2 Hardware Interfaces**

* A dedicated server will host the system and store the data, with high storage capacity for large datasets.

### **3.3 Software Interfaces**

* The system will interact with file formats such as CSV, Excel, and PDF for data import/export.
* Integration with data visualization libraries like D3.js and Chart.js for creating charts and graphs.

### **3.4 Communications Interfaces**

* Communication will occur via HTTP/HTTPS protocols, ensuring secure data transmission.

## **4. System Requirements**

### **4.1 Data Upload**

**Priority:** High  
Users will be able to upload crash data files for analysis.  
**Functional Requirements:**

* The system must support CSV and Excel file uploads.
* Data must be validated for structure and content before processing.

### **4.2 Data Filtering**

**Priority:** High  
Users can filter crash data based on several parameters.  
**Functional Requirements:**

* Filtering must be supported by parameters like date range, crash severity, location, and involved vehicles.
* Filter results should be instantaneous and exportable.

### **4.3 Data Visualization**

**Priority:** High  
The system will support the generation of visual data summaries.  
**Functional Requirements:**

* Users can create graphs and charts (e.g., crash trends, location-based incidents).
* Visualizations must be exportable as PNG or JPEG.

### **4.4 Report Generation**

**Priority:** High  
The system will allow users to generate reports summarizing the analysis.  
**Functional Requirements:**

* Users can select the data and visual components to include in reports.
* Reports must be exportable in PDF and Excel formats.

## **5. Non-Functional Requirements**

### **5.1 Performance Requirements**

* The system must handle millions of records efficiently, with filtered results displayed within 5 seconds.

### **5.2 Safety Requirements**

* All sensitive data must be secured and protected from unauthorized access.

### **5.3 Security Requirements**

* HTTPS will be used for secure data transmission, and data encryption will be applied to sensitive information during storage.

### **5.4 Software Quality Attributes**

* **Usability:** The interface should be user-friendly and easy to navigate.
* **Reliability:** The system must function reliably even with large datasets.
* **Scalability:** The system should scale to support increasing volumes of data as necessary.

## **6. Appendix A: Glossary**

* **Crash Data:** Traffic accident information, including the time, location, and involved parties.
* **CSV (Comma-Separated Values):** A simple file format used to store tabular data.