User Guide for Software Engineering: Alkalytics

Team 21, Alkalytics
Sumanya Gulati
Kate Min
Jennifer Ye
Jason Tran

April 1, 2025

Contents

1 Introduction

Section Overview

This section provides an orientation to the Alkalytics application, its purpose, and the scope of this documentation.

Welcome to the Alkalytics User Guide. This comprehensive document provides complete instructions for installing, configuring, and using all features of the Alkalytics web application.

1.1 Purpose

Alkalytics is designed to:

- Manage experimental data efficiently
- Provide powerful analysis tools
- Generate customizable visualizations
- Support collaborative research workflows

2 System Overview

Section Overview

This section describes the technical architecture, components, and requirements for running Alkalytics.

2.1 Architecture

Alkalytics is a React and TypeScript-based web application that runs locally for security purposes. The system architecture consists of:

- **Frontend**: Built with React and TypeScript
- **Backend**: Python processing with Univcorn server
- **Database**: MongoDB for data storage

2.2 Detailed Requirements

Description

Lists all hardware and software requirements for running the application.

2.2.1 Hardware Requirements

Component	Minimum	Recommended
RAM	8GB	16GB
Storage	10GB	50GB SSD
Processor	2 cores	4 cores

2.2.2 Software Dependencies

Software	Purpose	Version
Node.js	Frontend runtime	16.x LTS
MongoDB	Database	5.0+
Python	Backend processing	3.8+
Univcorn	ASGI server	0.15+

3 Installation Guide

Section Overview

This section provides complete step-by-step instructions for setting up the Alkalytics environment.

3.1 Step-by-Step Installation

1. **Prerequisite Installation**
   (a) Install Node.js from https://nodejs.org
   (b) Install MongoDB from https://www.mongodb.com
   (c) Install Python 3.x from https://www.python.org

2. **Repository Setup**

```
git clone https://github.com/your-repo/alkalytics.git
cd alkalytics
```

3. **Dependency Installation**

```
yarn install
pip install -r requirements.txt
```

4. **Database Configuration**

   (a) Create data directory:

   ```
   mkdir /data/db
   ```

   (b) Start MongoDB service:

   ```
   mongod --dbpath /data/db --port 27017
   ```

5. **Application Launch**

   (a) Start backend:

   ```
   yarn ts-node src/utils/server.ts
   ```

   (b) Start frontend:

   ```
   yarn start
   ```

   (c) Launch ASGI server:

   ```
   univcorn --port 8000 main:app
   ```

3.2 Verification

After installation, verify all components are running:

1. Frontend: `http://localhost:3000`
2. Backend: `http://localhost:8000/healthcheck`
3. Database: Check MongoDB connection on port 27017

4 User Management

Section Overview

This section details the different user roles (Admin and Researcher) and their respective capabilities within the application.

4.1 Admin Features

Description

Administrators have full control over all system functionality including data management, user configuration, and system settings.

4.2 Researcher Features

Description

Researchers can view data, run analyses, and generate reports but have limited system configuration capabilities.

5 Web Application Pages

Section Overview

This section covers all data handling operations including uploads, processing, and table management.

5.1 Upload Process

Description

The upload functionality allows users to import experimental data in various formats for analysis.

5.1.1 Step-by-Step Upload

1. Navigate to Upload Page
2. Select file type (Experiment Log or Raw Data)
3. Choose upload method:
    - Drag and drop files
    - Browse file system
4. Verify file preview
5. Click **Upload** button
6. Monitor progress in notification panel

5.1.2 File Requirements

Requirement	Specification
File Size	Maximum 10MB per file
Columns	Minimum 5 required fields
Date Format	YYYY-MM-DD
Special Characters	Avoid in header names

5.2 Table View

5.2.1 Table Editing

1. Navigate to Experiment Table
2. Click **Edit** button to enable editing mode

3. Modify cell values directly
4. Use **Save** button to commit changes

5.2.2 Column Management

- **Adding Columns:**
  1. Click **Add Column** button
  2. Enter column name in dialog
  3. Select data type from dropdown
  4. Click **Add Column** to confirm
- **Removing Columns:**
  1. Click **Remove Column** button
  2. Select column from dropdown
  3. Confirm deletion

5.2.3 Excel Function Bar

1. Select target rows using checkboxes
2. Choose destination column
3. Enter formula (e.g., `SUM(A,B)`)
4. Click **Apply** to execute

5.3 Graph Generation

Section Overview

This section provides detailed instructions for creating, customizing, and exporting data visualizations.

5.3.1 Detailed Workflow

Description

The five-step process for generating custom graphs from experimental data.

1. **Select Graph Type**
    - Line graph for trends
    - Bar graph for comparisons
    - Scatter plot for correlations
2. **Apply Filters**
    (a) Choose filter attribute (e.g., "# of Stacks")
    (b) Select filter value from dropdown
    (c) Apply date range if needed
3. **Set Parameters**
    - X-axis: Typically time or independent variable
    - Y-axis: Measurement or dependent variable
4. **Customize Display**
    - Title: Descriptive graph name
    - Axis Labels: Clear units of measurement
    - Range: Manual or automatic scaling
5. **Generate & Export**
    - Click **Submit** to render
    - Use **Export** button for PNG/PDF

6 Troubleshooting

Section Overview

This section lists common issues, error messages, and their solutions, along with advanced diagnostic procedures.

6.1 Common Issues

Issue	Solution	Error Code
Connection refused	Verify all services are running	ERR_CONN_REFUSED
Upload timeout	Check file size and network	408
Graph rendering failed	Validate data selection	VIS_ERR_001
Database not responding	Restart MongoDB service	DB_ERR_503

6.2 Advanced Diagnostics

Description

Technical procedures for diagnosing and resolving system issues.

1. Check application logs:

```
cat /var/log/alkalytics/app.log
```

2. Verify service status:

```
systemctl status mongod
yarn run status
```

3. Clear cache if needed:

```
yarn cache clean
```

7 Appendix

Section Overview

Additional reference materials including keyboard shortcuts, FAQs, and contact information.

7.1 Keyboard Shortcuts

Shortcut	Action
Ctrl+E	Toggle edit mode
Ctrl+S	Save current table
Ctrl+G	Open graph generator
Ctrl+F	Focus search bar

7.2 Frequently Asked Questions

- **Q: How to reset my password?**
  - Contact admin for password reset
- **Q: Can I import SQL databases?**
  - Currently only CSV and Excel supported
- **Q: Where are my uploaded files stored?**
  - In MongoDB under collections: experiments and raw_data