Algorithm and Data Structure

Country Management System

Comprehensive CLI Application for Country Data Management

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1. AUTHENTICATION SYSTEM

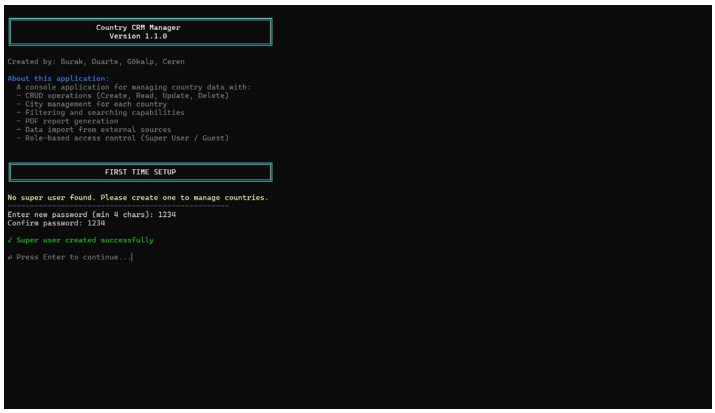
1.1 Super User Creation

On first run, the application prompts for a super user password. The password must be at least 4 characters long and requires confirmation by entering it twice. Encryption is performed using SHA256 algorithm with a random salt, and the hashed password is securely stored in the users.json file.

Technical Details:

- Minimum 4 characters password requirement
- Password confirmation mechanism
- SHA256 + 32-character random salt for secure hashing
- Encrypted storage in users.json file

Screenshot: First Time Setup



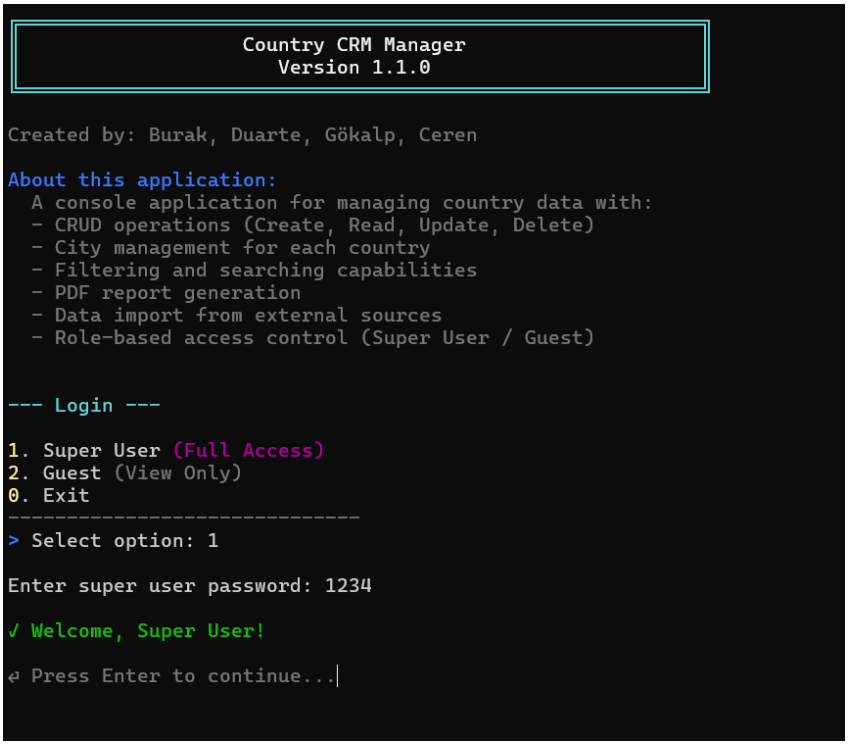
1.2 Login System

The system supports two different user roles. Super User has full access rights (CRUD + import + city management), while Guest users can only perform read operations (listing, filtering, searching, PDF export). In case of incorrect password entry, the user is given the opportunity to retry.

User Roles:

- **Super User:** Full access (CRUD + import + city management)
- **Guest:** Read-only access (listing, filtering, searching, PDF export)

Screenshot: Login Screen



2. COUNTRY MANAGEMENT (CRUD)

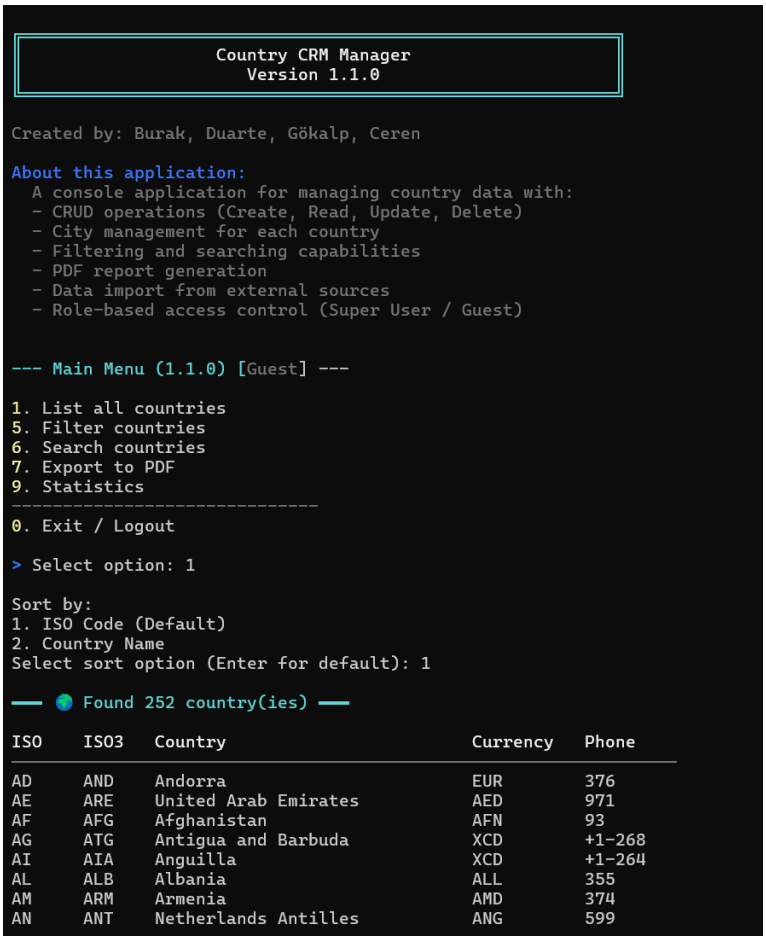
2.1 List Countries (Option 1)

All countries are displayed in a professional table format. The table includes ISO Code, ISO3 Code, Country Name, Currency, and Phone information. Users can sort countries by ISO Code or Country Name. With the detailed view option, all fields including cities can be listed.

Features:

- Professional table format view
- Sorting options: ISO Code / Country Name
- Detailed view: All fields including cities
- Displayed fields: ISO, ISO3, Country Name, Currency, Phone

Screenshot: Country List View



2.2 Add New Country (Option 2) - Super User Only

All fields are requested in form format with real-time validation. ISO code must be 2 characters and unique. ISO3 code must be 3 characters and unique. Country Name must also be unique. Each field is checked instantly as it is entered, and the addition is completed after a confirmation prompt.

Real-time Validation Rules:

- **ISO Code:** 2 characters, must be unique
- **ISO3 Code:** 3 characters, must be unique
- **Country Name:** Must be unique
- Instant validation as each field is entered
- Record saved after confirmation prompt

Screenshot: Add Country with Real-time Validation

```
--- Add New Country ---

Enter country details (press Enter to keep existing value):
----------------------------------------
ISO Code (2 letters): ptr
  ✗ ISO code must be exactly 2 characters
ISO Code (2 letters): PT
ISO3 Code (3 letters): PTR
Country Name: Portugal
Top-Level Domain: PT
Currency Code: EURO
Currency Name: Euro
Phone Code: 351
Postal Code Format:
Postal Code Regex:
Languages:
GeoName ID:

Enter cities (comma-separated, or press Enter to keep current):
Cities: Lisboa, Guarda, Porto

⚠Add country 'Portugal'? (y/n): y

✓ Country 'Portugal' added successfully
```

2.3 Edit Country (Option 3) - Super User Only

The country is selected by ISO code and current values are displayed. The current value can be preserved by pressing Enter. Real-time uniqueness checking is performed, but the country being edited is excluded from this check.

Process Steps:

- Country selection by ISO code
- Display of current values
- Press Enter to keep current value
- Real-time uniqueness validation

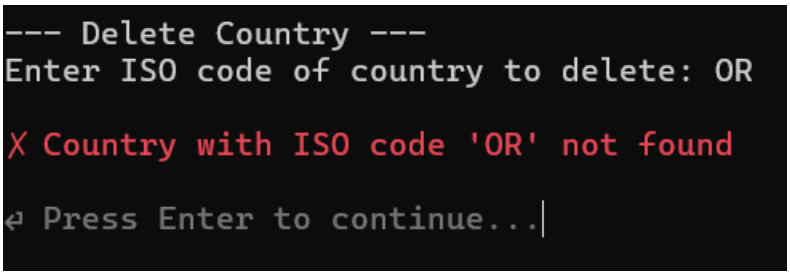
Screenshot: Edit Country

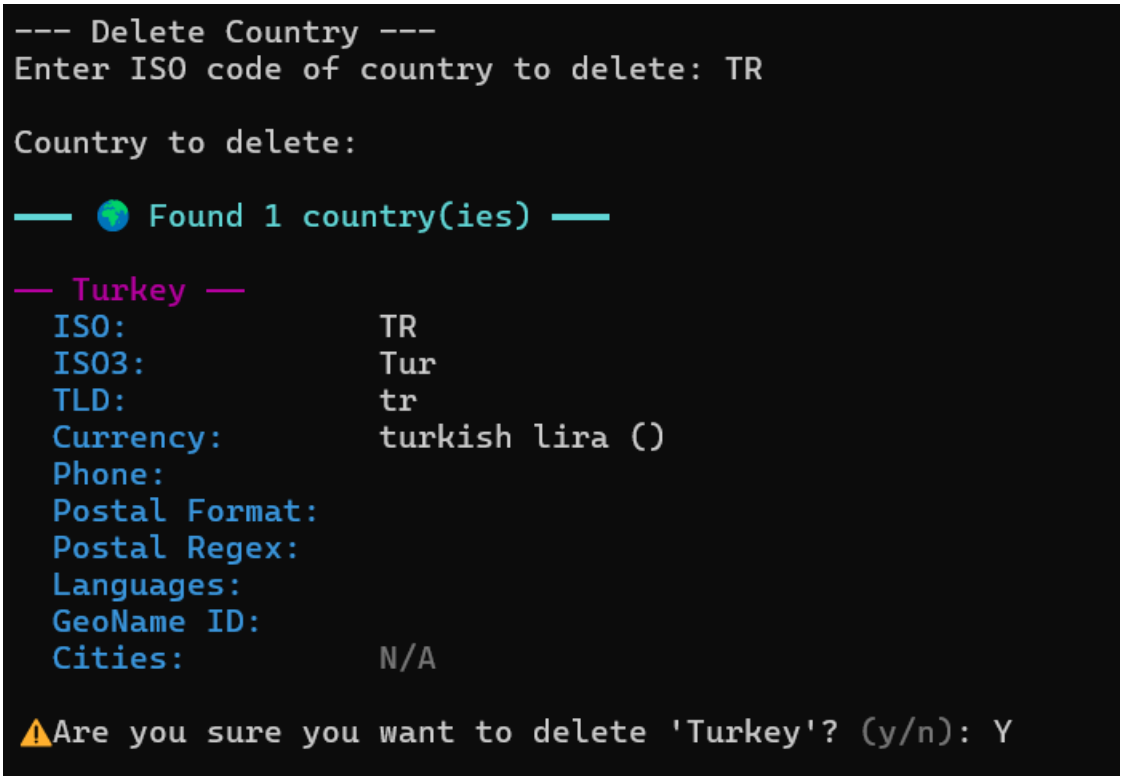
```
Current data:

── 🌍 Found 1 country(ies) ──

── Portugal ──
  ISO:              PT
  ISO3:             PTR
  TLD:              PT
  Currency:         EURO (Euro)
  Phone:            351
  Postal Format:
  Postal Regex:
  Languages:
  GeoName ID:
  Cities:           Lisboa, Guarda, Porto

Enter new values (press Enter to keep current):

Enter country details (press Enter to keep existing value):
----------------------------------------
ISO Code (2 letters) [PT]: TR
  ✗ ISO Code 'TR' already exists!
ISO Code (2 letters) [PT]: GR
  ✓ ISO Code is available
ISO3 Code (3 letters) [PTR]: GRT
  ✓ ISO3 Code is available
Country Name [Portugal]:
  ✓ Country Name is available
Top-Level Domain [PT]:
Currency Code [EURO]:
Currency Name [Euro]:
Phone Code [351]:
Postal Code Format:
Postal Code Regex:
Languages:
GeoName ID:

Current cities: Lisboa, Guarda, Porto

Enter cities (comma-separated, or press Enter to keep current):
Cities:

⚠️Update country 'PT'? (y/n): Y

✓ Country 'PT' updated successfully

⏎ Press Enter to continue...
```

2.4 Delete Country (Option 4) - Super User Only

The country is selected by ISO code. All information about the country to be deleted is displayed to the user, and the deletion is performed after confirmation. This operation is irreversible.

Screenshot: Delete Country Confirmation



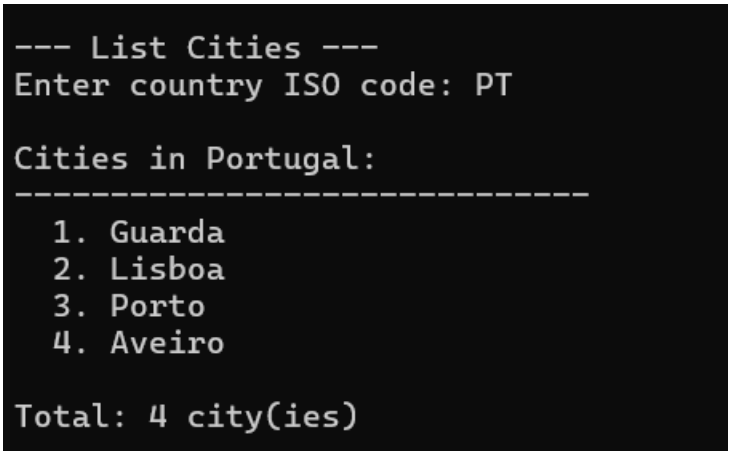


3. CITY MANAGEMENT (OPTION C)

3.1 List Cities

The country is selected by ISO code, and all cities of that country are displayed in a numbered list format. This format allows referencing by number when performing operations on cities.

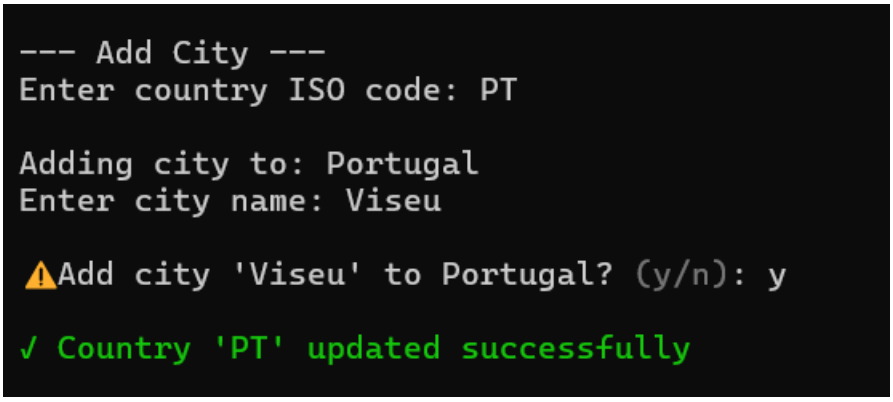
Screenshot: City List



3.2 Add City

The country is selected by ISO code, the new city name is entered, and duplicate checking is performed within the same country. This prevents two cities with the same name in the same country.

Screenshot: Add City



3.3 Edit City

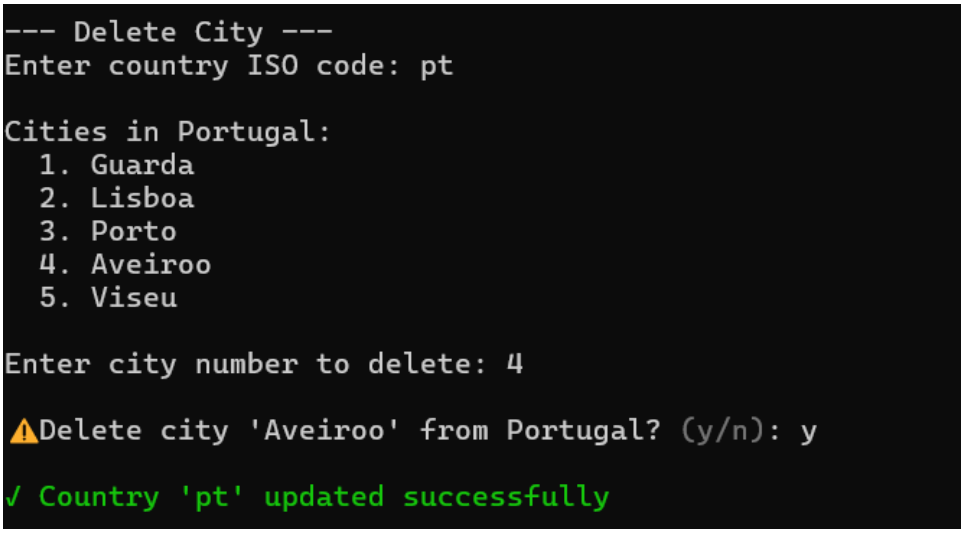
The country is selected by ISO code, the city is selected by number, a new name is entered, and duplicate checking is performed. The city being edited is excluded from this check.

Screenshot: Edit City

3.4 Delete City

The country is selected by ISO code, the city is selected by number, and after confirmation, the city is permanently deleted. This operation is irreversible.

Screenshot: Delete City Confirmation



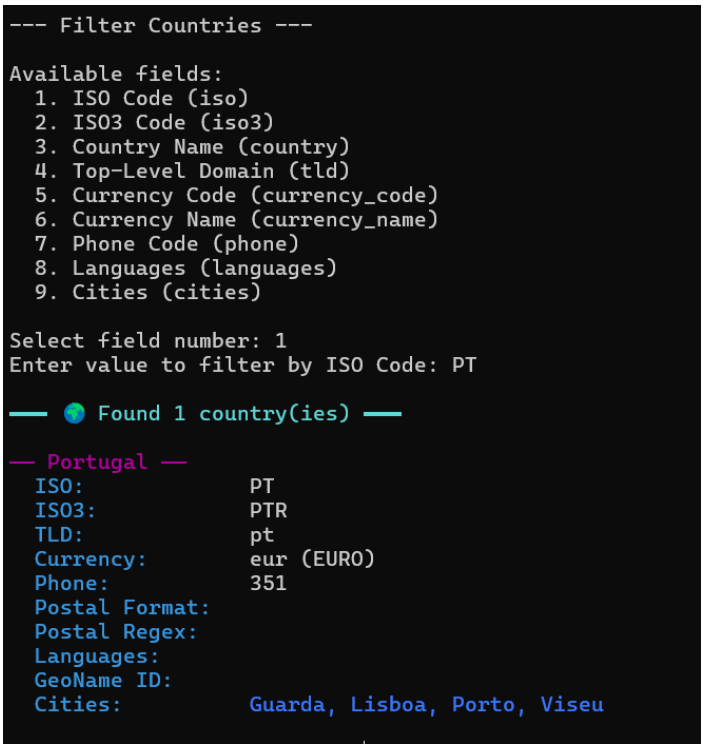
4. FILTERING (OPTION 5)

The filtering feature allows users to search in various fields and get case-insensitive results.

Filterable Fields:

- ISO Code
- ISO3 Code
- Country Name
- Top-Level Domain
- Currency Code
- Currency Name
- Phone Code
- Languages
- Cities

Screenshot: Filter Results



5. SEARCH (OPTION 6)

The search function performs global search across all fields. If the entered keyword appears in any field, results are returned. The search is performed case-insensitively.

Search Features:

- Global search across all fields
- Case-insensitive search
- Partial match support

Screenshot: Search Results

6. PDF EXPORT (OPTION 7)

The PDF Export feature allows all country data to be converted into a professional PDF report.

PDF Contents:

Page 1: Cover Page

- Logo (if logo.png exists)
- Application name (APP_NAME)
- Version information
- Date/time
- Creators list

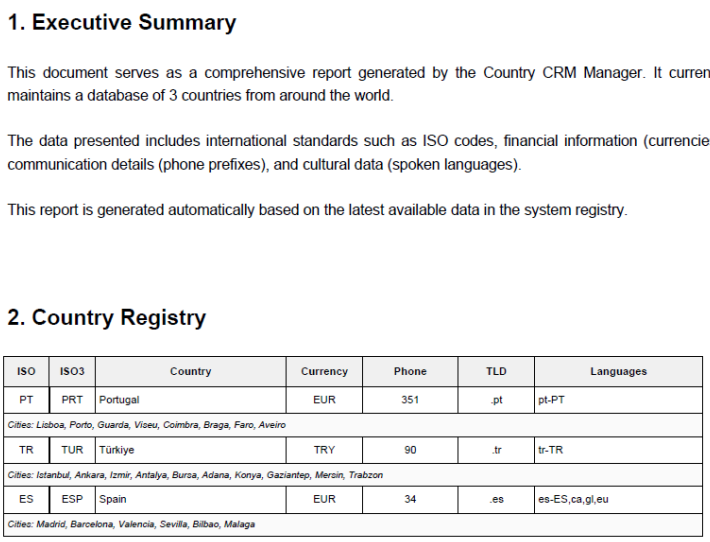
Page 2: Executive Summary

- Application description
- Total number of countries
- Data description

Page 3+: Data Table

- ISO, ISO3, Country, Currency, Phone, TLD, Languages, Cities
- Automatic page breaks at page end
- Table header repetition on each page

Screenshot: PDF Report Sample



1. Executive Summary

This document serves as a comprehensive report generated by the Country CRM Manager. It currently maintains a database of 3 countries from around the world.

The data presented includes international standards such as ISO codes, financial information (currencies), communication details (phone prefixes), and cultural data (spoken languages).

This report is generated automatically based on the latest available data in the system registry.

2. Country Registry

ISO	ISO3	Country	Currency	Phone	TLD	Languages
PT	PRT	Portugal	EUR	351	.pt	pt-PT
Cities: Lisboa, Porto, Guarda, Viseu, Coimbra, Braga, Faro, Aveiro						
TR	TUR	Türkiye	TRY	90	.tr	tr-TR
Cities: Istanbul, Ankara, Izmir, Antalya, Bursa, Adana, Konya, Gaziantep, Mersin, Trabzon						
ES	ESP	Spain	EUR	34	.es	es-ES,ca,gl,eu
Cities: Madrid, Barcelona, Valencia, Sevilla, Bilbao, Malaga						

7. IMPORT (OPTION 8 - SUPER USER ONLY)

The import feature allows bulk data loading from the countryInfo.txt file. The file must be in tab-separated format and column mapping is done with CSV_MAPPING.

Import Features:

- Reading from countryInfo.txt file
- Tab-separated format support
- Column mapping with CSV_MAPPING
- Adding to existing data
- Super User access only

Screenshot: Import Process

```
--- Import from Source File ---
This will import countries from 'countryInfo.txt'.
Existing countries with the same ISO code will be skipped.

⚠️Proceed with import? (y/n): y

Reading source file...

Found 252 valid countries in source.

√ Import complete. Added: 249, Skipped: 3
```

```
── 🌎 Found 252 country(ies) ──

ISO   ISO3   Country                          Currency   Phone
AD    AND    Andorra                          EUR        376
AE    ARE    United Arab Emirates             AED        971
AF    AFG    Afghanistan                      AFN        93
AG    ATG    Antigua and Barbuda              XCD        +1-268
AI    AIA    Anguilla                         XCD        +1-264
AL    ALB    Albania                          ALL        355
AM    ARM    Armenia                          AMD        374
AN    ANT    Netherlands Antilles             ANG        599
AO    AGO    Angola                           AOA        244
AQ    ATA    Antarctica
AR    ARG    Argentina                        ARS        54
AS    ASM    American Samoa                   USD        +1-684
AT    AUT    Austria                          EUR        43
AU    AUS    Australia                        AUD        61
AW    ABW    Aruba                            AWG        297
AX    ALA    Aland Islands                    EUR        +358-18
AZ    AZE    Azerbaijan                       AZN        994
BA    BIH    Bosnia and Herzegovina           BAM        387
BB    BRB    Barbados                         BBD        +1-246
BD    BGD    Bangladesh                       BDT        880
BE    BEL    Belgium                          EUR        32
BF    BFA    Burkina Faso                     XOF        226
BG    BGR    Bulgaria                         BGN        359
BH    BHR    Bahrain                          BHD        973
BI    BDI    Burundi                          BIF        257
BJ    BEN    Benin                            XOF        229
BL    BLM    Saint Barthelemy                 EUR        590
BM    BMU    Bermuda                          BMD        +1-441
BN    BRN    Brunei                           BND        673
BO    BOL    Bolivia                          BOB        591
BQ    BES    Bonaire, Saint Eustatius and     USD        599
```

8. STATISTICS (OPTION 9)

The statistics module provides detailed analytical information about the dataset.

Statistics Types:

- Total number of countries
- Currency distributions
- Language statistics
- Regional analyses

Screenshot: Statistics Dashboard

9. COLORFUL TERMINAL UI

The application provides a colorful and interactive terminal interface to enhance user experience.

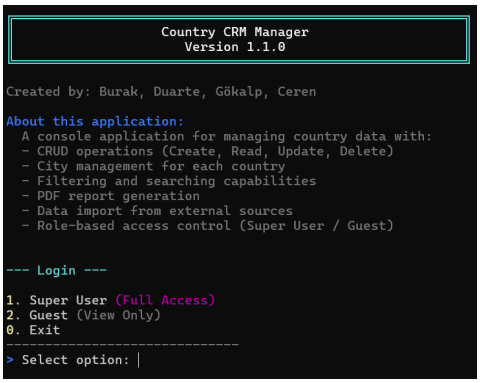
Color Usage:

- **Cyan:** Headers, field labels
- **Green:** Success messages (✓)
- **Red:** Error messages (✗)
- **Yellow:** Warnings, menu numbers
- **Magenta:** Highlights (Super User role)
- **Gray (dim):** Secondary information

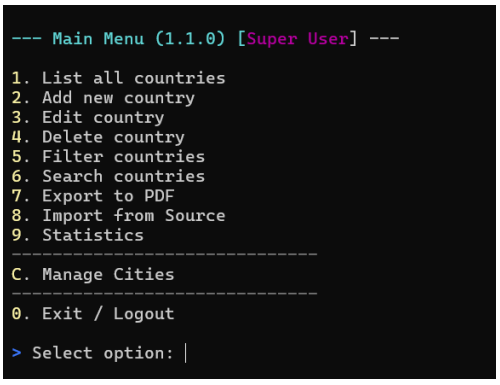
Visual Elements:

- Box borders (╔═══╗)
- Separator lines (──)
- Colorful input prompts

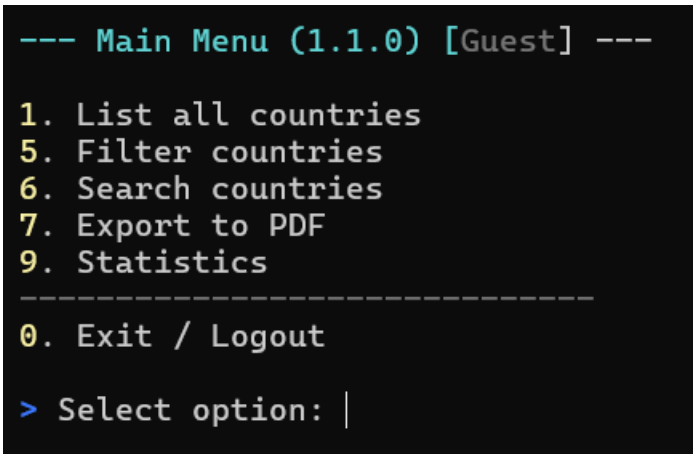
Screenshot: Terminal UI - Application Start



Screenshot: Super User Main Menu



Screenshot: Guest Main Menu



Screenshot: Success Message Example

Screenshot: Error Message Example

10. FILE STRUCTURE

The application has a modular file structure, and each module assumes a specific responsibility.

File/Folder	Description
main.py	Main application entry point
dados.json	Country data (including cities)
users.json	Encrypted super user information
country_types.py	Type definitions and validation
countryInfo.txt	Import source file
logo.png	Logo for PDF reports
components/	Module folder
constants.py	APP_NAME, CREATORS, APP_INTRO
colors.py	ANSI color codes
menu_component.py	All UI functions
data_handler.py	CRUD operations
filter_component.py	Filtering functions
pdf_component.py	PDF generation
importer_component.py	Import functionality
analytics_component.py	Statistics and analytics
handlers/	Handler modules
auth_handlers.py	Login and setup handlers
country_handlers.py	Country CRUD handlers
city_handlers.py	City CRUD handlers

11. SECURITY FEATURES

The application has various security layers and protects user data.

Security Mechanisms:

- **Password Hashing:** SHA256 + 32-character random salt
- **Role-based Access Control:** Super User vs Guest
- **Real-time Validation:** Duplicate checking in every field
- **Input Sanitization:** Strip and case handling
- **JSON Validation:** Data integrity checks
- **Secure File Storage:** Protected configuration files