



# 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

```
Country CRM Manager
Version 1.1.0

Created by: Burak, Duarte, Gökulp, Ceren

About this application:
- A console application for managing country data with:
  - CRUD operations (Create, Read, Update, Delete)
  - City management for each country
  - Filtering and searching capabilities
  - PDF report generation
  - Data import from external sources
  - Role-based access control (Super User / Guest)

FIRST TIME SETUP

No super user found. Please create one to manage countries.
Enter new password (min 4 chars): 1234
Confirm password: 1234

✓ Super user created successfully
* Press Enter to continue...
```

```
{ } users.json > ...
1  {
2    "super_user": {
3      "salt": "b85d2a95a46679dfafc36deb2174a45d",
4      "password_hash": "eb621b71d64e1ebbacb1acc7aca8082d5ba5b719be0774365f5000264bc772e0"
5    }
6  }
```

## 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

```
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  - PDF report generation
  - Data import from external sources
  - Role-based access control (Super User / Guest)

--- Login ---

1. Super User (Full Access)
2. Guest (View Only)
0. Exit
-----
> Select option: 1

Enter super user password: 1234

✓ Welcome, Super User!

␣ Press Enter to continue...|
```

## 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

```
Country CRM Manager
Version 1.1.0

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- City management for each country
- Filtering and searching capabilities
- PDF report generation
- Data import from external sources
- Role-based access control (Super User / Guest)

--- Main Menu (1.1.0) [Guest] ---
1. List all countries
5. Filter countries
6. Search countries
7. Export to PDF
9. Statistics
-----
0. Exit / Logout

> Select option: 1

Sort by:
1. ISO Code (Default)
2. Country Name
Select sort option (Enter for default): 1

— ● 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

## 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  
  X 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
X 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*

```
--- Delete Country ---
Enter ISO code of country to delete: OR

X Country with ISO code 'OR' not found

↵ Press Enter to continue...|
```

```
--- Delete Country ---
Enter ISO code of country to delete: TR

Country to delete:

— 🌐 Found 1 country(ies) —

— Turkey —
ISO:          TR
ISO3:         Tur
TLD:          tr
Currency:     turkish lira ( )
Phone:
Postal Format:
Postal Regex:
Languages:
GeoName ID:
Cities:       N/A

⚠️ Are you sure you want to delete 'Turkey'? (y/n): Y
```



## 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*

```
--- List Cities ---
Enter country ISO code: PT

Cities in Portugal:
-----
 1. Guarda
 2. Lisboa
 3. Porto
 4. Aveiro

Total: 4 city(ies)
```

### 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*

```
--- Add City ---
Enter country ISO code: PT

Adding city to: Portugal
Enter city name: Viseu

⚠ Add city 'Viseu' to Portugal? (y/n): y

✓ Country 'PT' updated successfully
```

### 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*

```
--- Edit City ---
Enter country ISO code: PT

Cities in Portugal:
1. Guarda
2. Lisboa
3. Porto
4. Aveiro
5. Viseu

Enter city number to edit: 4
Enter new name for 'Aveiro': Aveiroo

⚠️Rename 'Aveiro' to 'Aveiroo'? (y/n): y

✓ Country 'PT' updated successfully
```

### 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*

```
--- Delete City ---
Enter country ISO code: pt

Cities in Portugal:
1. Guarda
2. Lisboa
3. Porto
4. Aveiroo
5. Viseu

Enter city number to delete: 4

⚠️Delete city 'Aveiroo' from Portugal? (y/n): y

✓ Country 'pt' updated successfully
```

## 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

```
--- Filter Countries ---

Available fields:
1. ISO Code (iso)
2. ISO3 Code (iso3)
3. Country Name (country)
4. Top-Level Domain (tld)
5. Currency Code (currency_code)
6. Currency Name (currency_name)
7. Phone Code (phone)
8. Languages (languages)
9. Cities (cities)

Select field number: 1
Enter value to filter by ISO Code: PT

— ● Found 1 country(ies) —

— Portugal —
ISO:          PT
ISO3:         PTR
TLD:          pt
Currency:     eur (EURO)
Phone:        351
Postal Format:
Postal Regex:
Languages:
GeoName ID:
Cities:       Guarda, Lisboa, Porto, Viseu
```

## 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

```
--- Search Countries ---
Enter search term: Por

— 🌐 Found 1 country(ies) —

— Portugal —
ISO:          PT
ISO3:         PTR
TLD:          pt
Currency:     eur (EURO)
Phone:        351
Postal Format:
Postal Regex:
Languages:
GeoName ID:
Cities:       Guarda, Lisboa, Porto, Viseu
```

## 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: İstanbul, Ankara, İzmir, Antalya, Bursa, Adana, Konya, Gaziantep, Mersin, Trabzon						
ES	ESP	Spain	EUR	34	.es	es-ES, ca, gl, eu
Cities: Madrid, Barcelona, Valencia, Sevilla, Bilbao, Málaga						

## 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*

```
--- Statistics Dashboard ---
Total Countries: 252
-----
Top 5 Currencies:
  EUR: 36
  USD: 17
  XCD: 8
  AUD: 8
  XOF: 8
-----
Top 5 Languages:
  en: 48
  fr: 22
  ru: 15
  zh: 9
  hu: 7
```

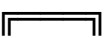

## 9. COLORFUL TERMINAL UI

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 (X)
- **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

```
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- City management for each country
- Filtering and searching capabilities
- PDF report generation
- Data import from external sources
- Role-based access control (Super User / Guest)

--- Login ---
1. Super User (Full Access)
2. Guest (View Only)
0. Exit
-----
> Select option: |
```

### Screenshot: Super User Main Menu

```
--- Main Menu (1.1.0) [Super User] ---

1. List all countries
2. Add new country
3. Edit country
4. Delete country
5. Filter countries
6. Search countries
7. Export to PDF
8. Import from Source
9. Statistics
-----
C. Manage Cities
-----
0. Exit / Logout

> Select option: |
```



*Screenshot: Guest Main Menu*

```
--- Main Menu (1.1.0) [Guest] ---  
  
1. List all countries  
5. Filter countries  
6. Search countries  
7. Export to PDF  
9. Statistics  
-----  
0. Exit / Logout  
  
> Select option: |
```

*Screenshot: Success Message Example*

```
✓ Country 'Portugal' deleted successfully
```

*Screenshot: Error Message Example*

```
✗ Country with ISO code 'PTR' not found
```

## 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