GeoScope Localization Toolkit
Documentation

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1 User documentation

1.1 Overview

GeoScope is a toolkit for geographical analysis and localisation of IP addresses, written in Java. The authors goal was to improve on the average precision of existing services.

GeoScope uses different services, like WHOIS servers and data of the IP registries.

GeoScope is made available in three parts:

• Program module:

  Contains the code of GeoScope and a graphical application (contained within the download archive).

  File name: geoscope-"version".jar

• Registry data:

  These are the data acquired from APNIC, RIPE, LACNIC and ARIN, converted into the native format of GeoScope. These data contain the ip ranges and the corresponding ISO-3166 country code.

  File name: geoscope-regdata-"date".zip/.bz2

• Geo data:

  This archive contains data converted from the NGA: GNS GEOnet Names Server and the U.S. Census 2000 Gazetteer.

  These files contain city names and longitude and latitude values.

  File name: geoscope-geodata-"date".zip /.bz2
1.2 Usage scenarios

- Analysis of networks.
- Geographical distribution of IP addresses.
- Usage statistics of public services, for example in combination with WWW server logfiles.
1.3 Installation

The following three files are required

- geoscope-„version“.zip/.bz2
- geoscope-regdata-„date“.zip/.bz2
- geoscope-geodata-„date“.zip/.bz2


1. Unpacking of the ZIP/BZ2 file.

Unpack the ZIP/BZ2 file in a folder. All relevant files will be extracted into a folder called geoscope-„version“.

2. Unpacking of the registry data.

Unpack the ZIP/BZ2 file in a separate folder for easier handling.

3. Unpacking of the geo data.

Unpack the ZIP/BZ2 file in a separate folder for easier handling.
### 1.4 Usage of the graphical tool

To start the graphical tool of GeoScope, double-click on the geoscope-„Version“.jar file – or start the tool from the command line, replacing 'Version' with the version number of the file you downloaded:

```
> java -jar geoscope-'Version'.jar
```

![Scope – the graphical tool of GeoScope (shown with German dialogs)](image)

**Illustration 1: Scope – the graphical tool of GeoScope (shown with German dialogs)**

Enter the path where the geo data (files ending on „.geo“) have been extracted to or simply click on the „...“ button and select one file from within that folder.

Enter the path where the registry data (files ending on „.grg“) have been extracted to or simply click on the „...“ button and select one file from within that folder.

Now enter the IP address or a hostname and click on the OK button. The results will appear in the lower frame.
Illustration 2: Search results (shown with German dialogs)
1.5 Errors

- No window opens up!

Did you install Java?

GeoScope requires a minimum Java version of 1.3 that you can download for the following operating systems from

- [http://blackdown.org](http://blackdown.org) (Linux)

Are .jar files associated with the Java Runtime Environment?

Try starting Scope from the command line

```bash
> java -jar geoscope-"Version".jar
```

- “No information was found.”

Did you select the right folders?

The folder for geo data should contain files ending on “.geo”. The folder for registry data should contain files ending on “.grg”.

Faulty WHOIS data?

Even with though GeoScope usually has a high precision, GeoScope cannot guarantee 100% accuracy. The reasons are incomplete or erroneous WHOIS records.
GeoScope does not yet support IPv6.

Note: We are working on enabling IPv6 for GeoScope.

You reach the developers by emailing mailto:grnull@users.sourceforge.net and mailto:sh0gun@users.sourceforge.net. Let us know if you're interested in IPv6.

- Various error messages

  „UnknownHostException: [...]“

GeoScope must be able to communicate with WHOIS servers. Verify that your internet connection is up. WHOIS servers might be unavailable.

Check your internet connection or try again later.

  „com.eaio.geoscope.GeoScopeException“

GeoScope must be able to communicate with WHOIS servers. Verify that your internet connection is up. WHOIS servers might be unavailable.

Check your internet connection or try again later.
1.6 Comments

The Toolkit does not offer a world map visualisation. GeoScope was planned as a toolkit that can be extended by more visualisation options. Visualisation through a world map was not initially planned for GeoScope.
2 Developer documentation

2.1 Structure

GeoScope requires three components to work – one to access registry data, one to access geo data and an (optional) component to persistently save generated data:

- `com.eaio.geoscope.configuration.RegistryProvider`
- `com.eaio.geoscope.configuration.GeoDataProvider`
- `com.eaio.geoscope.configuration.PersistenceProvider`

GeoScope is built in a way that both file-based implementations and relational databases can be used for each component.

We provide a file-based implementation for two components (to access registry and geo data). These implementations use binary search and have a very high performance that will only rarely be obtained from relational databases. We therefore recommend using the built-in classes.

We provide an abstract base class for persistence with relational databases:

- `com.eaio.geoscope.configuration.implementations.DataSourceJDBCProvider`
2.2 Package overview

- com.eaio.geoscope.configuration

  Contains interfaces and classes to configure GeoScope instances.

- com.eaio.geoscope.configuration.implementations

  Base classes to extend for your own providers.

- com.eaio.geoscope.geodata

  Classes to convert geo data. A file-based provider for geo data.

- com.eaio.geoscope.persistence

  Implementations of the PersistenceProvider interface.

- com.eaio.geoscope.registry

  Classes to convert registry data. A file-based provider for registry data.

- com.eaio.geoscope.scope

  The graphical tool for GeoScope.

- com.eaio.geoscope.tools

  Utility classes for working with IP addresses and strings.

- com.eaio.geoscope.whois

  The WHOIS interface. Classes for the extraction of city names and description fields out of WHOIS entries.
• com.eaio.lol

  Classes to simplify localisation and internationalisation. These classes have been written by Johann Burkard and are licensed under the same license as GeoScope (see appendix).

• com.eaio.lol.exceptions

  Pre-made, localisable exception classes. These classes have been written by Johann Burkard and are licensed under the same license as GeoScope (see appendix).

• com.eaio.stringsearch.io

  Classes for fast searching in files. These classes were written for the StringSearch project of Johann Burkard that is licensed under the same license as GeoScope (see appendix).

• com.eaio.util.lang

  Base classes for shell applications.

• com.eaio.util.ui

  Base classes for UI elements like banners and windows.
### 2.3 Important classes

- **com.eaio.geoscope.GeoScope**

  The GeoScope class encapsulates the GeoScope business logic. GeoScope has the `locate(InetAddress)` and `locateAll(InetAddress)` methods through which you can search for information about IP addresses.

- **com.eaio.geoscope.IPInfo**

  IPInfo encapsulates generated data. This contains the ISO-3166-Code of the country, the name of the city, the position of the city and the start and end IP address of the range that the IP address searched is registered in.

- **com.eaio.geoscope.Point**

  Point encapsulates a point on the earth with it's longitude and latitude values.

- **com.eaio.geoscope.configuration.GeoScopeConfiguration**

  GeoScopeConfiguration is the class that encapsulates the selected providers. You can create a GeoScope instance with a GeoScopeConfiguration object. GeoScopeConfiguration is serializable and configurations can therefore be saved to disk or transmitted through a network.
2.4 Reusing GeoScope in your own applications

- Write your own providers

  \[ \text{I} \text{com.eaio.geoscope.configuration.GeoDataProvider,} \]
  \[ \text{I} \text{com.eaio.geoscope.RegistryProvider,} \]
  \[ \text{I} \text{com.eaio.geoscope.configuration.PersistenceProvider} \]

  (optional) – or use the ones that are provided with the application.

- Instantiate the geo data provider.

- Instantiate the registry data provider.

- Instantiate the persistence provider (optional).

- Construct a

  \[ \text{C} \text{com.eaio.geoscope.configuration.GeoScopeConfiguration} \]

  object using the three providers.

- Set the autoSave property, if the first one of multiple hits should always persistently saved (optional).

- Create a GeoScope instance.

- Use the \texttt{locate} or \texttt{locateAll} methods to obtain either one or all possible IPInfo objects.

- Further use or processing of the extracted data.

If you do not use the graphical tool (or write one yourself), the following packages and files may be removed from the JAR file:

- \texttt{com.eaio.util.ui}

- \texttt{com.eaio.geoscope.scope}

- \texttt{geoscope_g_icon.gif}

- \texttt{geoscope_g_logo.gif}
2.5 Sequence of an analysis

- Binary search in files ending on "grg" for the country, IP range and the matching WHOIS server for an IP address.
  
  \[ \text{I com.eaio.geoscope.configuration.RegistryProvider} \]
  \[ \text{C com.eaio.geoscope.registry.RegistryFileProvider} \]

- Query WHOIS servers for the IP address
  
  \[ \text{C com.eaio.geoscope.whois.WHOISLookup} \]

- Filter out the city’s name
  
  \[ \text{C com.eaio.geoscope.whois.CityParser} \]

- Filter out the description of the WHOIS entries
  
  \[ \text{C com.eaio.geoscope.whois.DescriptionParser} \]

- Searching the geographical position of all cities with equal name
  
  \[ \text{I com.eaio.geoscope.configuration.GeoDataProvider} \]
  \[ \text{C com.eaio.geoscope.geodata.GeoDataFileProvider} \]

- Returning the results as an IPInfo array
  
  \[ \text{C com.eaio.geoscope.IPInfo} \]
3 Project documentation

3.1 Team

- Johann Burkard
  Conception, planning, english documentation, classes, website, Javadoc

- Siniša Stevanović
  Conception, planning, classes, business plan, german documentation, supporting bugfixes, test runs
3.2 Contact information

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3.3 Source material

All code was developed by the GeoScope team, with the exception of the following classes and classes in the following packages:

• com.eaio.stringsearch.io

  These classes were written by Johann Burkard for the StringSearch project and are licensed under the same license as GeoScope (see appendix).

• com.eaio.lol und com.eaio.lol.exceptions

  These classes were written by Johann Burkard and are licensed under the same license as GeoScope (see appendix).

• com.eaio.util.ui.StackLayout

  StackLayout was written by Bruce R. Miller (bruce.miller@nist.gov) and released as public domain (see appendix).
Geo data was obtained from the following servers:

- NGA: GNS GEOnet Names Server
  
  http://earth-info.nga.mil/gns/html/

- U.S. Census Bureau
  
  http://www.census.gov/geo/www/gazetteer/places2k.html

More information about these services can be found at:

- http://www.census.gov/geo/www/gazetteer/places2k.html
- http://www.census.gov/geo/www/tiger/tigermap.html#ZIP
- http://www.nga.mil/portal/site/nga01/
- http://www.census.gov/main/www/policies.html#

Registry data was obtained from the following servers:


More information about these services can be found at:

- ftp://ftp.ripe.net/ripe/stats/_README
- ftp://ftp.arin.net/pub/stats/arin/README

Additional URLs:

- Sourceforge project page: https://sourceforge.net/projects/geoscope/
- Sorceforge: https://sourceforge.net/
- Sourceforge CVS: https://sourceforge.net/cvs/?group_id=107324
3.3 Time schedule

- 15.04.2004: Business plan
- 29.04.2004: Prototype
- 15.06.2004: Full functionality
- 29.06.2004: Full functionality, graphical user interface, country data, city name prefixes
- 01.07.2004: Documentation

Planned features:

- Support for IPv6
- Support for databases through JDBC
- Creation of a database of IP information
- Selling of generated data
3.4 Acknowledgements

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- Siniša Stevanović thanks team member Johann Burkard for the insight in systematic programming and the knowledge and experience I gained throughout our work.
3.5 License of GeoScope

e aio: GeoScope - IP localization

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3.6 License of StringSearch

eaio: StringSearch - high-performance pattern matching algorithms in Java
Copyright (c) 2003, 2004 Johann Burkard (jb@eaio.com) http://eaio.com

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3.7 License of lol

eaio: lol - a Localization library
Copyright (c) 2003, 2004 Johann Burkard (jb@eaio.de) http://eaio.com

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3.7 License of StackLayout

******************************************************************************
gui.StackLayout

Simple layout manager for filling a panel horizontally or vertically.

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