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# The SIMBAD database

*Marc Wenger*

# SIMBAD Content

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## A database collecting data for more than 5,000,000 astronomical objects

- Stars, galaxies, in general objects outside the solar system
- **Basic data** (coordinates, proper motions, radial velocities, parallaxes, spectral and morphological types, etc ...)
- **Identifiers.** Cross identifications among many catalogs. 10500 different acronyms, 745 objects with more than 40 identifiers, 1 object with 103 identifiers
- **References.** 3,425,000 objects share 210,000 references providing 8,175,000 citations
- **Measurements.** 3300000 measurements in 35 catalogs for 2,000,000 objects
- **Notes.** For 47,000 objects
- **Links** to other services (VizieR, Heasarc, NED)
- **Annotations** from users

# Simbad : a 40 year story

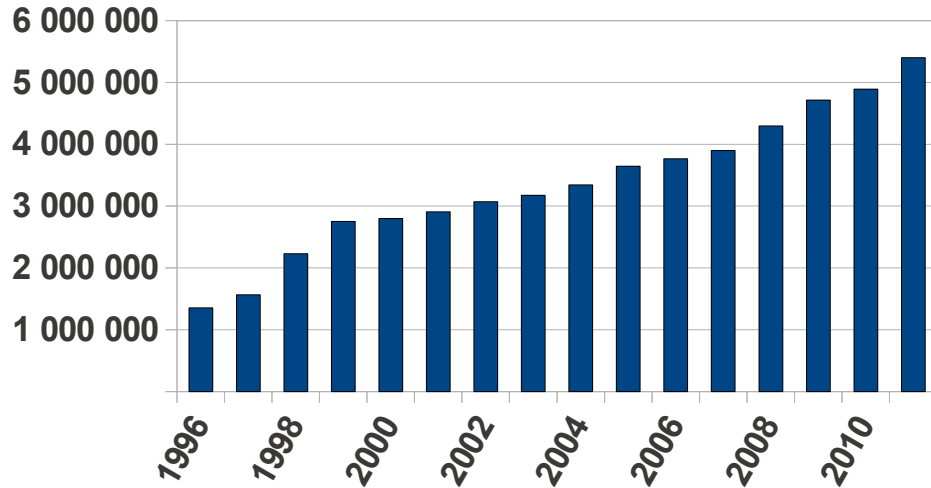
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## Four major versions :

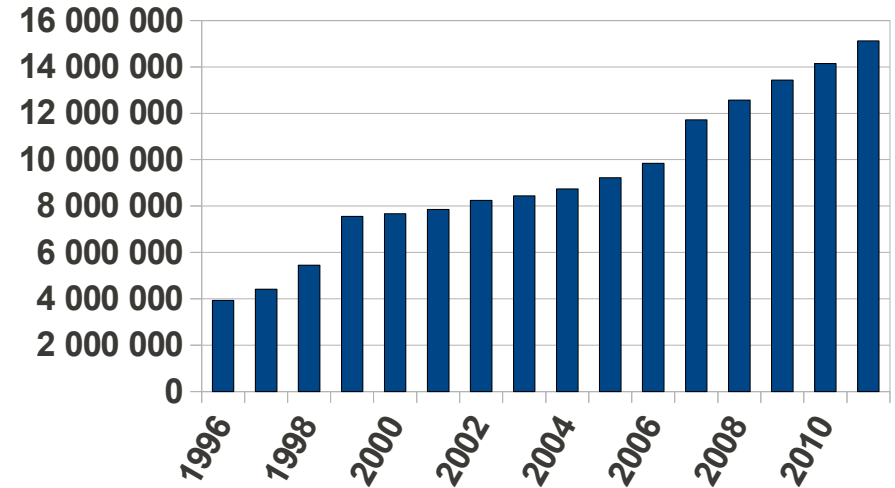
- Born with the CDS in **1972** as the CSI (Catalog of Stellar Identifications). Keypunched cards, IBM 360/65 in Meudon, access through dedicated lines for the French community
- Rewritten in **1981** on a Univac 1110 in Strasbourg. Access in command line mode though packet switching networks. In 1988, first usage of Internet in France across the Atlantic for demos in the USA (Lisa I and IAU meeting)
- New release in **1990** (C language) on Unix stations at the Observatory. Access through Internet. Graphical interface, Web. From 50 to 20,000 queries/day in 16 years.
- Today: Simbad4 since **Dec 2006** (Java language, Linux servers). 5,000,000 objects, 265,000 queries/day in 2010.

# Simbad : content evolution 1996 - 2011

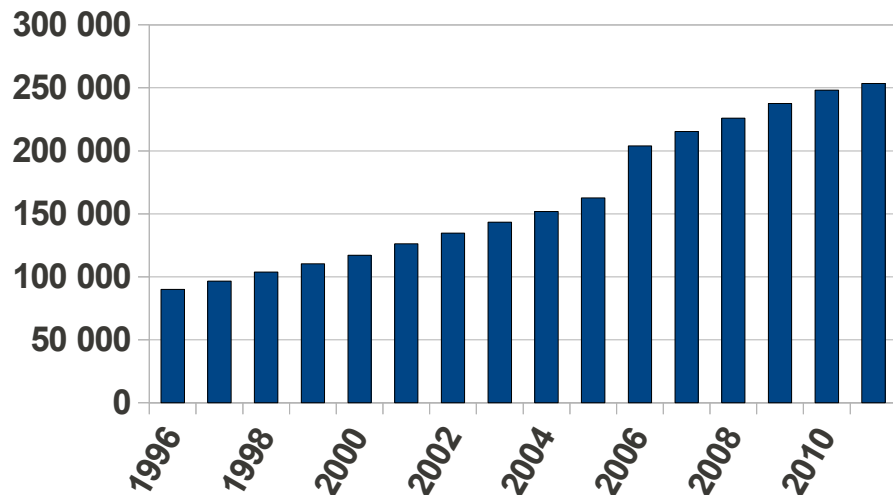
## Objects



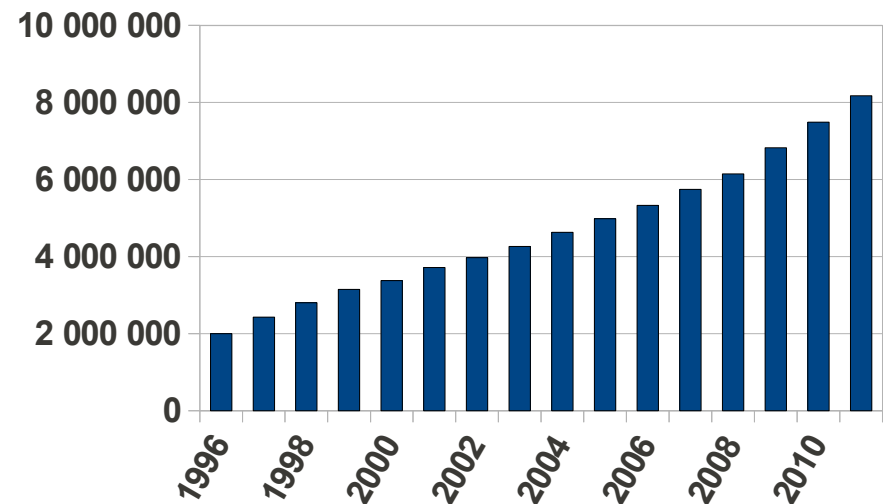
## Identifiers



## References

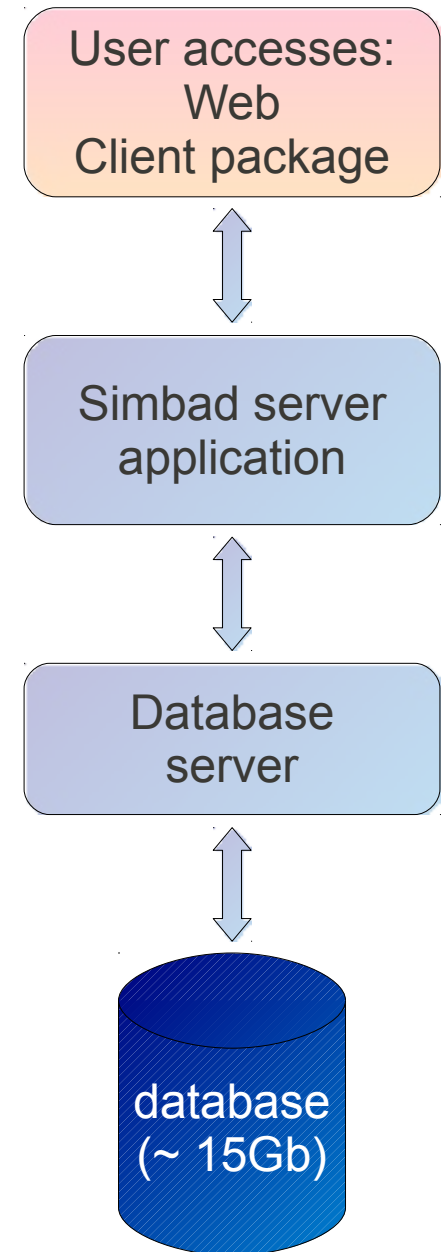


## Citations



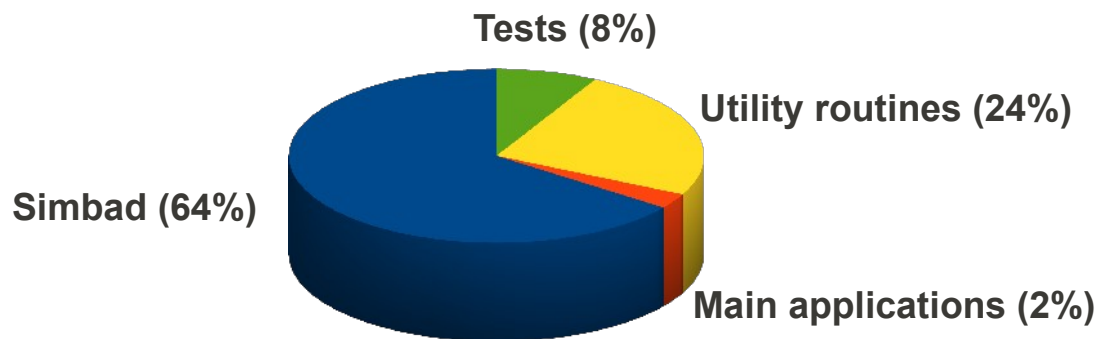
# Simbad current environment

- **SIMBAD** runs on three **Linux** Pcs
- **Security**: only one server, managing the user interfaces, is accessible from the outside world
- The Database Management System is **PostgreSQL**, an open source relational DBMS
- A **mirror**, nightly updated, runs at the **CfA**

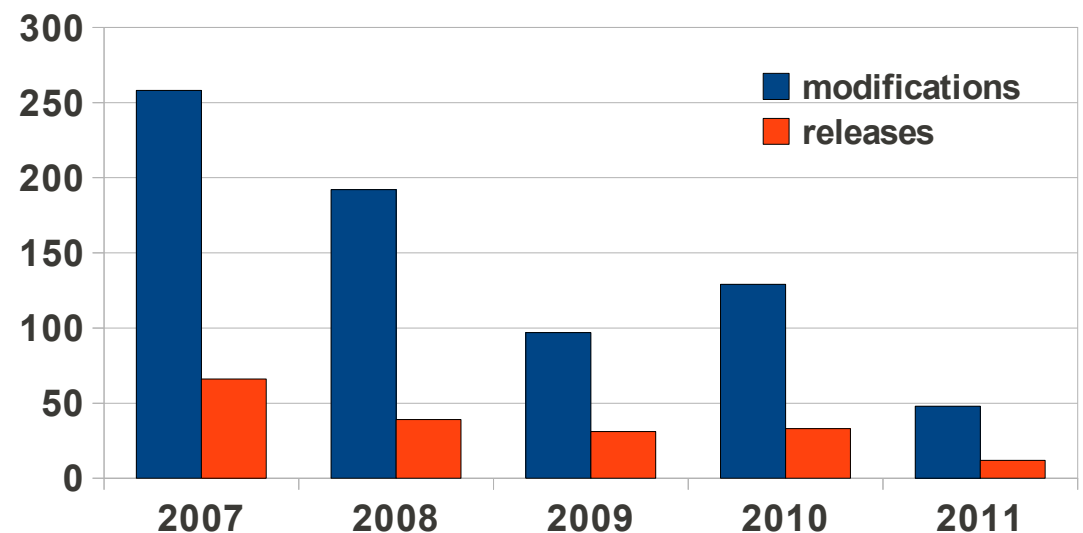


# Simbad software

- Two main developers: Anaïs Oberto, Marc Wenger
- The software is 99% written in Java (+1% scripts)
- 330,000 lines of code in 1170 Java classes



- the software evolution shows in 4 ½ years 720 modifications in 180 releases.



# Software usage

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- Queries through web pages
- Queries in applications using URL accesses
- Queries through the Simbad client (simcli) package for 'legacy' applications in C language, in particular observatory archives including major NASA archives
- Sesame : a name resolver facility implemented as a Web service
- Queries by identifiers, references, coordinates and regions, criteria
- Output formats : HTML, Ascii, VOTable, JSON

# Some Simbad accesses

**SIMBAD: Query by identifiers**

other query modes : Identifier query | **Coordinate query** | Criteria query | Reference query | Basic query | Script submission | Output options | Help

**Query an Identifier**

Identifier :  Examples: *sirius, M31, MCG+02-60-010*  
*How to write an identifier can be found in the dictionary of IAU format can also be used, with the following format: iau [J]B]1230+08 [\* enlarging-factor] [= Object-type]*

you can choose to query :  around the object, define a radius :

**Query a list of identifiers**

Enter the name of an ASCII file produced by a text editor containing one identifier per line:

list display  full display

query around the objects with radius :

Simbad interface

## SIMBAD Name Resolver usage in ESO Archive

If you would like to query the Archive for instrument specific parameters, please use the dedicated search for **reduced Data Products**, please have a look at the ESO Data Products page and

The checkboxes on the right of the parameters define whether or not they will be displayed on

Target, Program and

Target Name  Resolved by SIMBAD

RA  DEC

Search Box  Input

Output  Sexagesimal (h, deg)

List of Targets  Parcourir...

**esa ISOC SCIENCE DATA ARCHIVE**

Query Specification | Latest Results | Shopping Basket | Login/Register | Logout | Request Monitor

logged in  title

Execute Query | Cancel Query | View/Edt SQL

Results Display | Observation Group | Search Criteria | Start Date | Search Order | Ascending

Class: **Search by Source**

Name:

Open: [Principal Search Criteria](#)

Open: [Resolution and Observation](#)

Open: [Observation Groups and Exposures](#)

Open: [Science Windows](#)

Open: [Instrument Modes](#)

Open: [Proposal](#)

Open: [ISOC Source Catalog](#)

Help: Integral Science Data Archive Applet Help

Search by Source: The target name is first resolved into coordinates by SIMBAD (see below). Then, a simple search is performed to request all the observations whose position is embedded within a square of 9 degrees (corresponding to the IRIS Fully Coded Field of View), centered on the source name (resolved) position.

The name resolution service of the ISDA is provided in collaboration with the SIMBAD project, Centre de Données astronomiques de Strasbourg, France. The user entered names for SIMBAD are passed without parsing. Please consult <http://cdweb.u-strasbg.fr/simbad.html> for more info on the syntax to be used.

in ESA ISOC Science Data Archive

**ads labs ADS Beta**

Home | Labs Home | All

black holes

Author | First author | Title | Object

Sort by

Most recent

Most relevant

Most cited

Most popular

**black holes - Most relevant**

NO FILTERS APPLIED

**FILTER BY:**

Authors

Keywords

Archives

Missions

**SIMBAD Objects**

Other object (55)

Galaxy (52)

Radio Source (16)

Star (15)

X-Ray Source (6)

Infrared Source (1)

**Vizier Tables**

Optical (7)

AGN (1)

- 1973A&A....24..337S **Black holes in binary** Shakura, N. I.; Sunyaev, R. A. *Astron. Astrophys.*, Vol. 24, p. 337 - 355 n/a 1973 [Matches in fulltext](#)
- 1975CMaPh..43..199H **Particle creation by** Hawking, S. W. *Communications In Mathematical Physics*, Volume [Matches in Abstract](#)
- 2006MNRAS.365...11C **The many lives of black holes and the luminosities and colours of** Croton, Darren J.; Springel, Volker; White, Simon D. M.; Jenkins, A.; Kauffmann, G.; Navarro, J. F.; Yoshida, M. *Monthly Notices of the Royal Astronomical Society* [Matches in Abstract](#) / [Matches in fulltext](#)
- 2000ApJ...539L...9F **A Fundamental Relation between Black Holes and Their Host Galaxies** Ferrarese, Laura; Merritt, David *The Astrophysical Journal*, Volume 539, Issue 1, p. [Matches in Abstract](#) / [Matches in fulltext](#)
- 1983bhwd.book.....S **Black holes, white d**

ADS Labs SIMBAD object types from a list of references

**Search MAST for a Target or Mission**

Enter Target name (or Coordinates):

Resolver:  SIMBAD  NED  Don't resolve

and/or Band/Data Type(s): [more options](#)

Extreme UV  Far UV  Near UV  Optical  Near IR  Radio

Images  Spectra  Other

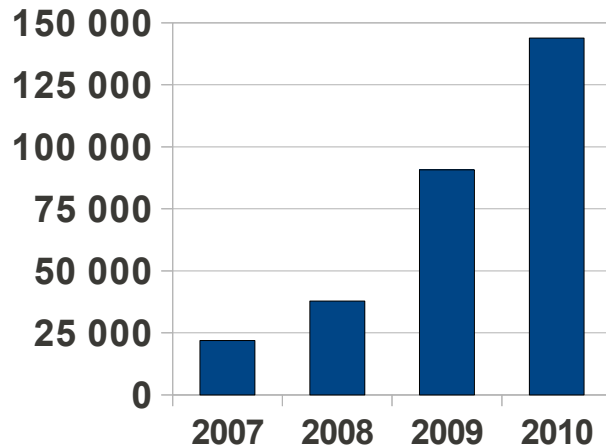
Search | Reset | Help

in STScI MAST Archive

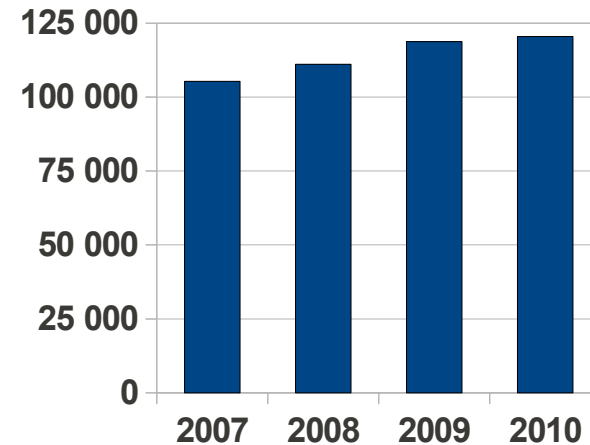


# Usage statistics

## Web queries / day

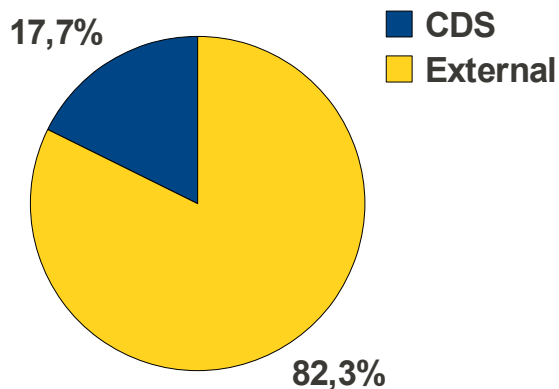


## Simcli queries / day

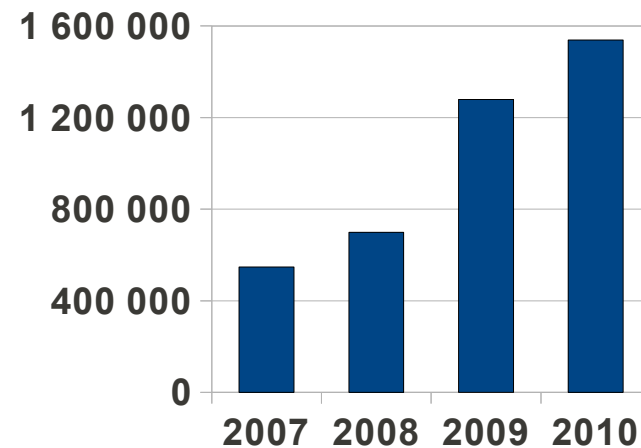


2010:  
265,000  
queries/day

## Ratio CDS/external queries

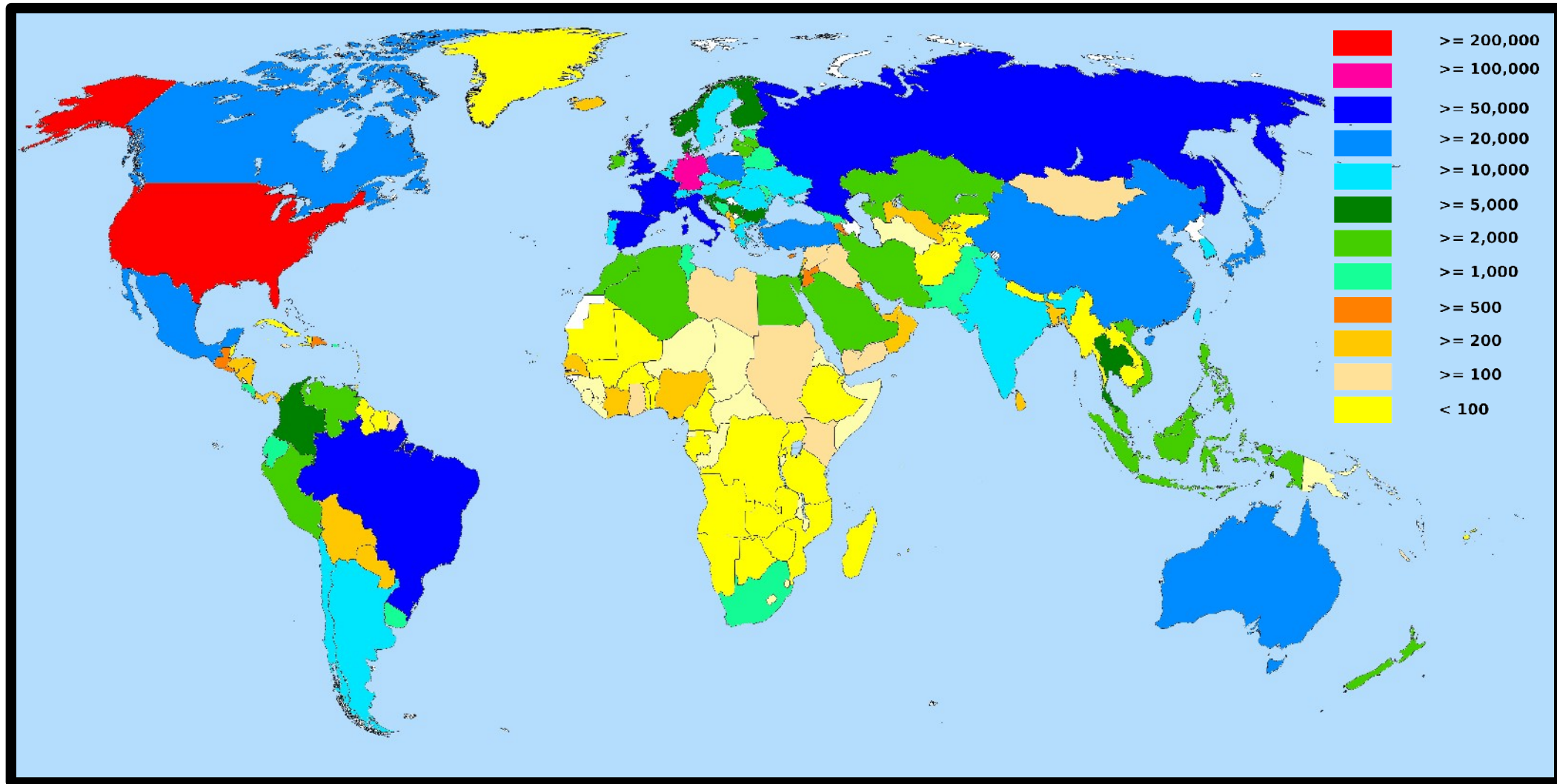


## Different IP addresses / year



# Users / country

Different users (IP addresses) from Jan 2007 to Jun 2009 : 223 countries



Four countries have never used SIMBAD in these 30 month:  
Western Sahara, Kosovo, Azerbaidjan, North Korea

# Evolutions

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- Implemented in 2010 : **User annotations** in objects
- To come in 2012 / 2013:
  - A **new Web interface**, more interactive rich web client using up-to-date technologies (HTML5, CSS3 and JQuery/Javascript)
  - A better integrated **on-line help** pages and **user's guide**
  - **Query optimisation**, already prototyped in the *name resolver* facility