



Software Release Note

NEOPOP

Near Earth Object Population
Observation Program

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1 Introduction

This document is about the Near-Earth Object Population Observation Program (NEOPOP) 1.2 release. It is meant as a basic overview of the release; for detailed descriptions please refer to chapter 3.

2 Software Overview

NEOPOP allows users to create and analyze Near-Earth Object (NEO) populations and to simulate and analyze observations of such populations.

Populations may be created randomly or based on two NEO models that have been validated scientifically. Various population properties can be plotted in 2D and 3D as well as in scatter and solar system overview plot form.

Population observations may be simulated by defining ground- or space-based locations as well as optical and radar sensors. The results of observations can be plotted in the same way as it is the case for population analyses (sky plots are available additionally, though).

NEOPOP consists of the Command-Line Tool (CLT) and the Graphical User Interface (GUI). On Windows it comes with the plotting program gnuplot, version 4.6.

The CLT is the main tool, is written in Fortran and yields the main functionalities described above. Users provide configuration and input files to tell the tool what to do when executed. As a result, the tool creates text files which – depending on the settings in the input files – contain generated populations, observation results, summaries, instructions for gnuplot or measurements.

The GUI is based on Eclipse Rich Client Platform (Eclipse RCP) and thus written mainly in Java. It serves as a front-end for the tool. Because of this, users can change the tool's configuration and input files, run it and view the tool's output files through the GUI in a graphical and user-intuitive way.

3 Documentation

As stated before, this document is meant as a basic release overview. There are two documents giving you more information about certain topics in the context of NEOPOP. The Software User Manual [02] explains how to install, configure and use NEOPOP in detail. It also contains a tutorial. The theory behind NEOPOP's algorithms, models etc. is described in the Final Report [01].

[01]	J. Gelhaus, G. Hahn and S. Müller, " <i>The Near Earth Object Population Observation Program</i> ", Final Report, ESA/ESTEC Contract No: 4000106274, 2014
[02]	J. Gelhaus and S. Müller, " <i>The Near Earth Object Population Observation Program</i> ", Software User Manual, ESA/ESTEC Contract No: 4000106274, 2014

4 System Requirements Specification

In order to ensure that NEOPOP runs correctly on your system, your operating system must meet the following requirements:

Processor Architecture	32-bit (x86) or 64-bit (x86-64)
Processor	AMD or Intel @ 2,8 GHz
RAM	Min. 2 GiB
Disk Space	Min. 2 GiB
Operating System	Either: <ul style="list-style-type: none"> • Windows 7 or 8 • Linux with GNU C Library (glibc) 2.x where $x \geq 5$. This applies, for example, to <ul style="list-style-type: none"> ○ openSUSE 12.3 through 13.2 ○ CentOS 5.11 through 7.0 ○ Ubuntu 8.04 through 14.04 ○ Debian 5 through 7
Operating System Architecture	32-bit (x86) or 64-bit (x86-64)
Java Runtime Environment	Java Standard Edition Runtime Environment 1.7 which is also known as Java 7
gnuplot	Exactly v4.6 (including 4.6.1, 4.6.2 etc.) <ul style="list-style-type: none"> • On Windows: is installed together with NEOPOP • On Linux: must be installed separately
PDF Viewer	like Adobe Reader or Okular, optional
Text Editor	like Notepad++ or gedit, optional

Note that, however, in all cases, later versions of, for example Windows or Java should work.

PDF Viewer and text editor are not required to start the GUI and run the tool. Without them you can't open PDF and text files through the GUI though – including the Software User Manual. You can define the programs of your choice at any time after installation via the settings button in the toolbar of the GUI. On Linux systems, popular choices for PDF readers include “acroread”, “okular” or “evince”; popular graphical text editors are “kate” or “gedit”. When setting them in the GUI, they have to be prefixed with their full path (usually “/usr/bin” on Linux and “C:\Program Files\” on Windows).

5 List of Tools and Libraries

In the following a table is provided stating all tools and libraries that NEOPOP uses:

Tool/Library	Version	Purpose	Licensing	Distribution site
SPICE Toolkit for Fortran	N0064 June 11, 2010	Part of NEOPOP used for calculation purposes, error handling and more	Free of licensing	http://naif.jpl.nasa.gov/naif

Cairo library	1.0.2	Part of Linux versions of GUI. It's a graphics toolkit used by Eclipse launcher.	Mozilla Public License Version 1.1 ("MPL")	http://www.cairographics.org/
pixman library	0.1.6	Used in Cairo Library	Specific licenses; see NEOPOP license agreement for details	http://www.cairographics.org/snapshots
gnuplot tool	4.6	Packaged with NEOPOP, used by GUI to create plot picture files	Gnuplot Copyright	http://www.gnuplot.info/
GNU C Library (glibc, only on Linux)	2.5	Major system library	GNU Lesser General Public License	https://www.gnu.org/software/libc/

6 Installation

NEOPOP is distributed by installers that come on DVD or as compressed archive (e. g. "zip"). Both on DVD and in the archive you'll find two executable files. You need to execute the correct one for your operating system:

- Linux: setup-linux.bin
- Windows: setup-windows.exe

On 64-bit Linux systems, you might also have to install your distribution's 32-bit compatibility library package (usually called "ia32-libs", "libc6:i386" or "libc6-i386") since the installer itself is a 32-bit binary. Once NEOPOP is installed in its 64-bit version, these libraries are not required anymore.

7 New Features

The new features in v1.2 are:

- Usage of SPICE kernel files for the definition of space-based sensor locations
- Validity check of all NEOPOP input data in GUI before running a project
- Calculation of latitude and longitude of ground-based sensor locations defined by observatory code in GUI
- Possibility to run Crossing Analysis on external population files
- (lots of bug fixes)

8 Known Limitations

- For some problems and possible solutions, please consult section chapter 10 in Software User Manual