

# Graph **Your Code** Vulnerabilities

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# Project scope

**Analyze** GitHub projects structure

**Collect** project elements and dependencies

**Detect** libraries and code and store as graph

**Verify** exposure to CVE vulnerabilities

**Visualize** as intuitive graph representation



# Inspiration

When **log4j vulnerability** CVE-2021-44228 exposes many Java servers to the possible exploration, there should be the easy way to validate for our software are we exposed

Why we wouldn't be able to visualize our **software structure** as graph of **dependencies** and analyze which components are **exposed** to CVE security issues

Dependencies to other **repositories, libraries and projects** increase complexity of the problem, but can be easy represented and visualized using **graph technology**



# Public Security Information

## Common Vulnerability Exposure

The mission of the CVE® Program is to identify, define, and **catalog** publicly disclosed **cybersecurity vulnerabilities**

Currently, there are **166,475+** CVE Records accessible



## National Vulnerability Database

Repository of standards based **vulnerability management** data

The NVD performs analysis on **CVEs that have been published**



## Common Platform Enumeration - CPE

Common Vulnerability Scoring System - CVSS



# Using Graph Models

## Nebula Graph Database

**Easy**

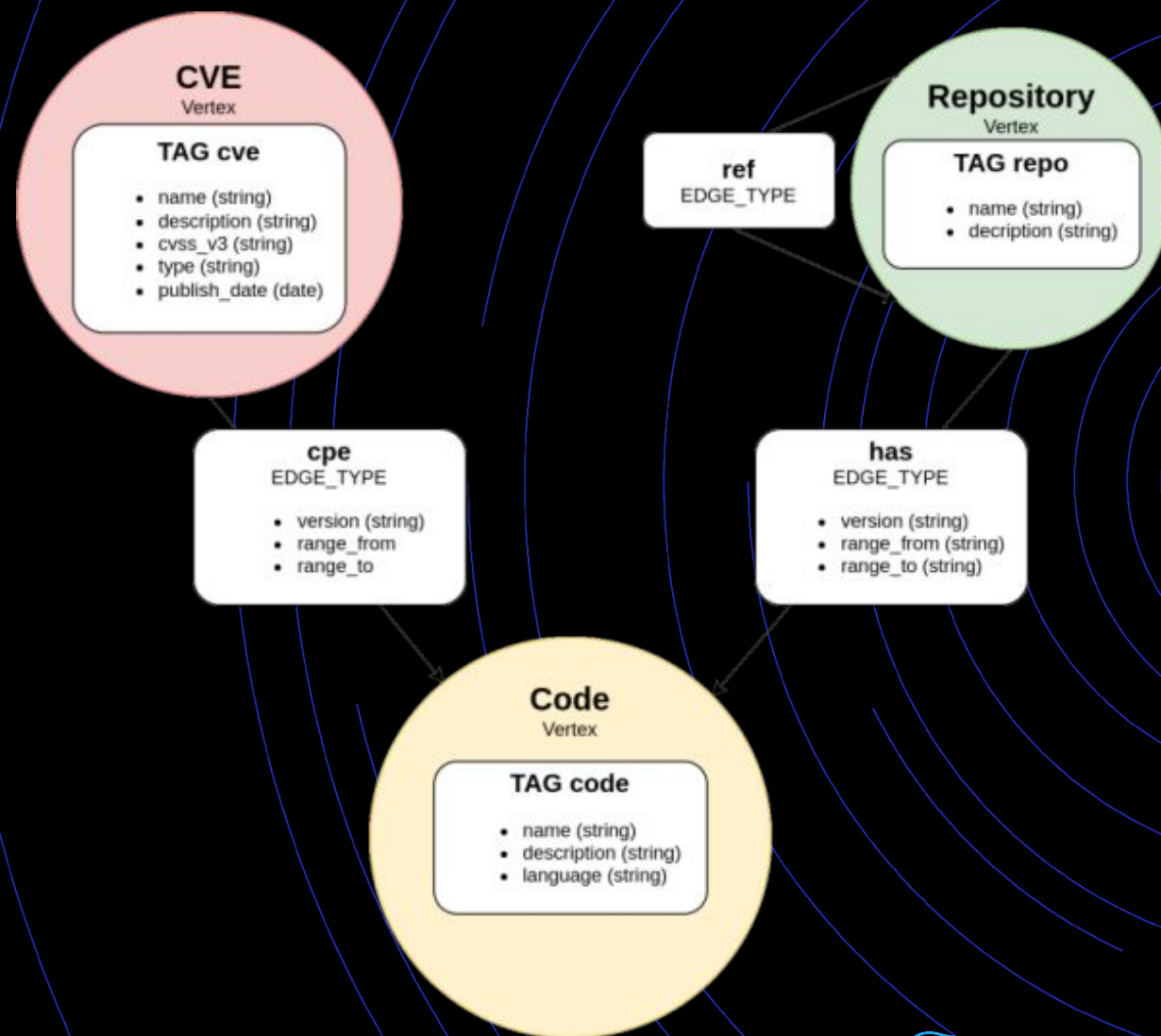
to model data

**Easy**

to maintain and synchronize data

**Powerful & Fast**

to handle huge dataset



# Implementation

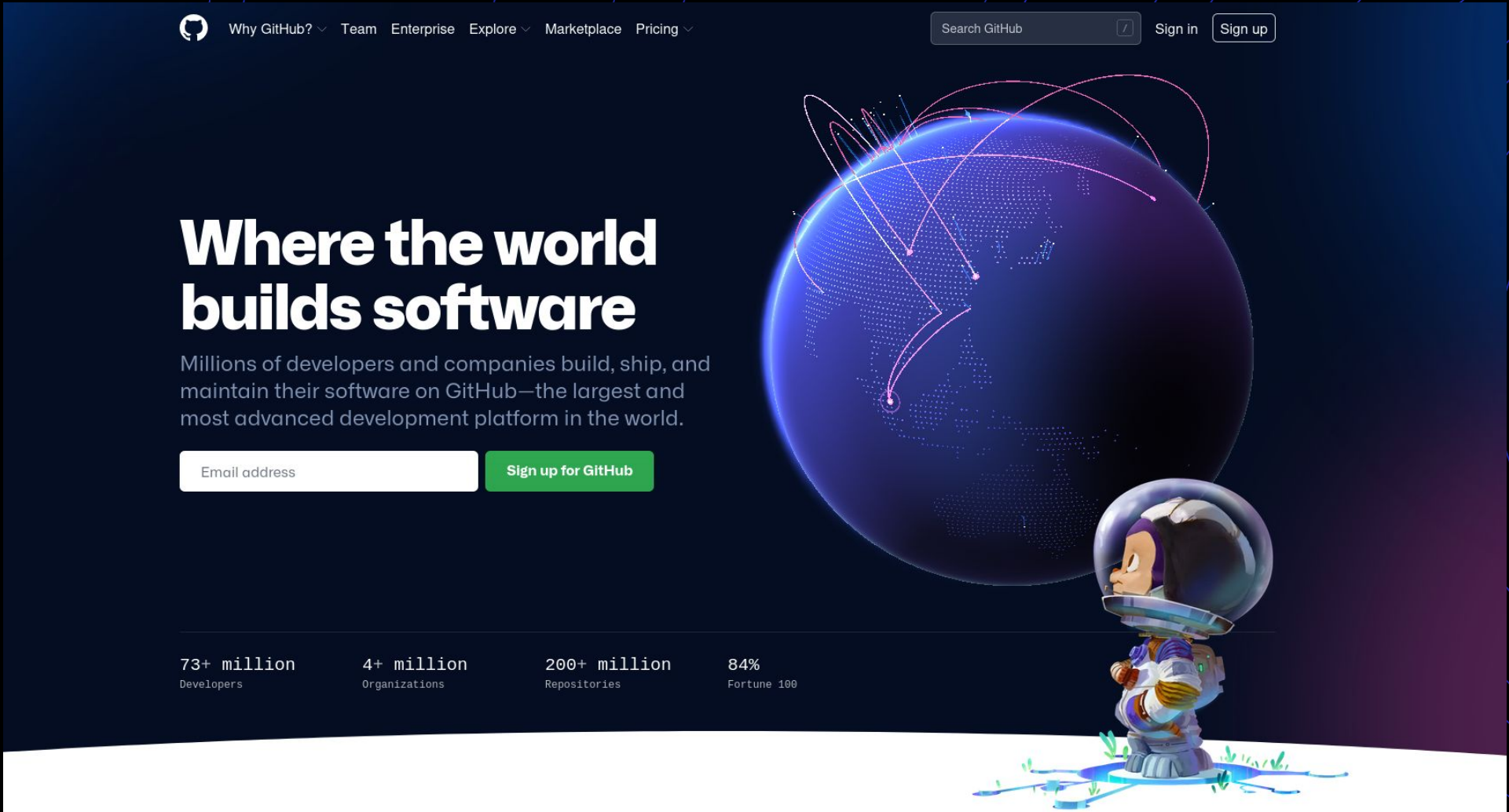
## Python code

- Custom **python** code for web application service
- **Nginx** web server
- **Nebula Graph** database integrated with Elasticsearch engine
- **Javascript** visualization library

## Data collector for CVE

Custom python code **integrated** with CVE and CPE sources about new **vulnerabilities detected**

# Why this is important ?

A screenshot of the GitHub homepage. The background is dark blue with a large, glowing globe in the center. The globe has a grid of dots and several red orbital lines. In the bottom right corner, there is a small, stylized astronaut character standing on a white surface with some green plants. The top navigation bar includes the GitHub logo, links for 'Why GitHub?', 'Team', 'Enterprise', 'Explore', 'Marketplace', and 'Pricing', a search bar, and 'Sign in' and 'Sign up' buttons. The main heading is 'Where the world builds software'. Below it is a subheading: 'Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.' There is a sign-up form with an 'Email address' input field and a 'Sign up for GitHub' button. At the bottom, there are four statistics: '73+ million Developers', '4+ million Organizations', '200+ million Repositories', and '84% Fortune 100'.

Why GitHub? Team Enterprise Explore Marketplace Pricing

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## Where the world builds software

Millions of developers and companies build, ship, and maintain their software on GitHub—the largest and most advanced development platform in the world.

Email address Sign up for GitHub

73+ million Developers  
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# Why this is important ?

GitHub Security

## Trusted by millions of developers

We protect and defend the most trustworthy platform for developers everywhere to create and build software.

[Explore security at GitHub Universe](#)

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NebulaGraph



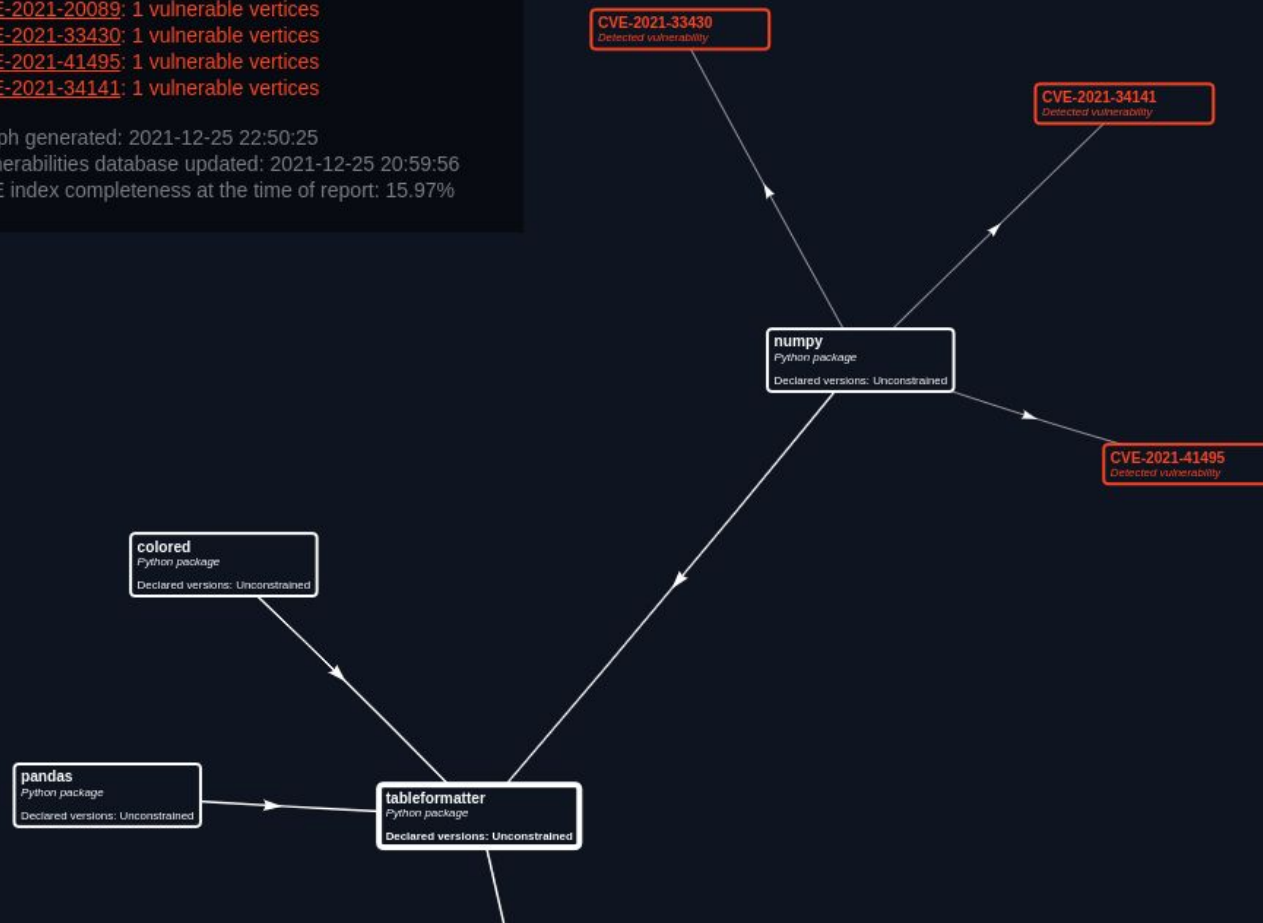
# It is **Your Code** !

## Let's make whole GitHub **more secure**

Graph for <https://github.com/vesoft-inc/nebula>

[CVE-2021-20089](#): 1 vulnerable vertices  
[CVE-2021-33430](#): 1 vulnerable vertices  
[CVE-2021-41495](#): 1 vulnerable vertices  
[CVE-2021-34141](#): 1 vulnerable vertices

Graph generated: 2021-12-25 22:50:25  
Vulnerabilities database updated: 2021-12-25 20:59:56  
CVE index completeness at the time of report: 15.97%



The background features a series of concentric circles in a light blue color. In the center, there is a complex, colorful graphic composed of various segments, including circles, arcs, and squares in shades of blue, teal, purple, orange, and yellow, arranged in a circular pattern.

# Thank you