
AURsec

A blockchain aproach to securing software packages

Bennett Piater & Lukas Krismer

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Supervisor: Christian Sillaber

University of Innsbruck

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1 Introduction

The linux distribution Arch has one of the most active communities. This is the reason why there was the need for a place, where users could upload their own packages in a repository. <ftp://ftp.archlinux.org/income> was born. But the packages were not available for other users till a Package Maintainer adopted them. The progression were the Trusted User Repositories, where some users were allowed to host their own repositories for anyone to use. On this base the AUR (Arch User Repository) was evolved. Everybody is allowed to upload packages, without any checks, to the AUR and everyone may download them. But the big usability has a disadvantage: security. [1]

2 Security Issues of the AUR

Ease of use appears to have been, if not the only, at least the primary design consideration of the Arch User Repository. This creates so many security issues that it is actually quite a task to think through all of them.

Local Package Creation

One of the most obvious problems is the installation procedure itself. The AUR doesn't host binary packages, which is a good thing. Instead, Arch packages are created locally from a bash file, the so-called PKGBUILD, containing metadata like name and version, the URLs and checksums of upstream sources, and functions for the compilation and packaging steps.

The AUR contains these PKGBUILDS and possible patches to be applied to the upstream sources in a git repository per package. A package file can be produced by cloning it's repository and using a tool called `makepkg` [2], which sources the script, downloads and verifies the sources, and calls the compilation and packaging functions.

This means that users can verify what they are compiling as opposed to blindly trusting binaries created by third-parties, but also that maintainers of AUR packages have a means of executing arbitrary shell commands on users' machines.

This is aggravated by the fact that PKGBUILDS can include a `.install` file into the built package, which will be executed *as root* when the package is actually installed. The risk also increases if so-called "AUR helpers" are used. These tools assist the users in installing packages from the AUR by automating the steps and behave like package managers. Some of them (notably `aurutils` [4], which is recommended by the authors) allow the users to inspect these files before continuing, but others are very unsafe in that they execute code before giving users the opportunity to inspect it, or incentivize them from doing so.

The Trust Issue

Another problem is that users are not given any reason to trust the maintainers. Unlike the official repositories, where maintainers are vetted, packages are (often manually) audited before being accepted, and everything must be signed with a trusted GNU Privacy Guard key, anyone can create an account and submit a new package to the AUR in a few minutes. There is no admission procedure or audit system and no GnuPG web of trust in order to minimize the time needed to publish a package or update.

`makepkg` can verify GnuPG signatures for upstream sources, but the PKGBUILD itself could only be signed by using signed git commits, which is sadly not enforced or even officially recommended — and not supported by any AUR helper anyway.

Except when using the AUR helper `bauerbill` [5], which provides a basic user-side trust management system, the only way to maintain reasonable trust is therefore to manually read every single file, which is cumbersome. Because only highly security-conscious users are willing to put in so much effort before trusting a PKGBUILD, most users are left vulnerable by the aforementioned issues.

Adopting orphan packages

VCS Packages: Malicious Upstream

[3]

Tampered Packages: Malicious Maintainer

3 The Solution

3.1 Core Solution

3.2 Detailed Description

3.3 Terminal User Interface

3.4 Project Management

4 Things we Learned

5 Evaluation

References

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