**////Title: ReSOLV: Preventing Software Piracy with Cryptocurrency Blockchain Technology**

**////Standfirst:**

Software piracy is a large and growing problem. The methods used to combat it are becoming increasingly complex as technology evolves, costing software publishers and users billions of dollars each year. Dr Alan Litchfield from the Auckland University of Technology and Jeff Herbert from Cybercraft, New Zealand, have developed a new method to suppress software piracy. In a recent paper, they present ReSOLV – a method for software validation based on cryptocurrency blockchain technology.

**////Main text:**

Software piracy has been a problem for nearly 50 years, for both organisations and PC users. Often, users are unaware of the illegitimacy of pirated software, leaving them vulnerable to products that contain malware. The estimated cost of unlicensed is on the order of 46.4 billion US Dollars every year, and the additional costs associated with encountering malware through pirated software take that figure to a startling 359 billion dollars.

Methods of controlling copyrighted software range from physical key codes or hardware such as dongles, to online licence validation. Larger companies, such as Microsoft, use Software Licence Validation services. However, as technology and software continuously evolve, Software Licence Validation is becoming more convoluted and difficult to implement and maintain.

As Software Licence Validation becomes more complex, it is becoming increasingly challenging to prevent pirates from bypassing these complicated licensing programmes entirely.

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The ease at which information is transmitted over the internet makes it relatively easy for software piracy to occur, and the internet’s global reach makes it difficult for ownership to be enforced in all jurisdictions. In fact, in 2018 the Business Software Alliance claimed that 37% of software installed on home computers was not properly licensed.

This is compounded by the fact that current cloud-based subscription models may not be reducing the volume of licence breaches as much as expected – with more than 50% of users sharing credentials. The Business Software Alliance also reported a strong correlation between unlicenced software use and malware rates. While app stores offer greater protections for developers in recent years, piracy as ‘code reuse’ is a significant problem and may affect up to 20% of all app downloads, demonstrating its pervasiveness on all computing platforms.

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In their recent research, Dr Alan Litchfield from the Auckland University of Technology and Jeff Herbert from Cybercraft, New Zealand, examined current piracy countermeasures and discovered that though they addressed specific types of piracy problems, none provided a complete solution. Each piracy countermeasure may support either the software developers or the platforms, the licences, applications or end users, but never all at once.

The available countermeasures also often introduced new problems, such as added complexity or increased administration and challenges for the end user. Following this study, Litchfield and Herbert developed a solution that addresses these weaknesses, while also matching the strengths of currently used techniques.

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In a new paper published in the journal *Cryptography*, Litchfield and Herbert propose a fresh solution to the illegal distribution of software with ‘ReSOLV’. This decentralised, ‘peer to peer’, publicly auditable Software Licence Validation is based on cryptocurrency blockchains, similar to Bitcoin.

The team’s technology can be used by anyone – from an independent software writer to a large software vendor. Importantly, it addresses many of the shortcomings of previous copywrite protection techniques.

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ReSOLV is based on cryptocurrency blockchains. These are a decentralised form of currency – not run by any bank or government – that operates on a ‘peer to peer’ system. Cryptocurrency blockchains work by using a publicly available ledger of all transactions which is made up of a ‘chain of blocks’, where each block reports a transaction. When two users wish to make a transaction, they use secure Public Key Cryptography to add a new block to the ledger, for which there are many verifiable copies.

Software Licence Validation solutions implemented today require users to identify themselves, with a software licence being assigned to them. When this is not the case, then once the user has the licence there is nothing to stop it being shared and pirated.

ReSOLV solves this problem by being a decentralised Software Licence Validation that uses the cryptocurrency ‘coins’ as tokens to represent entitlement to use the software. This system allows users to hold licences that are verifiable through the blockchain, while remaining anonymous. Software developers are then able to distribute licences to users easily and cost effectively.

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The ReSOLV blockchain enables all common licensing models. It also addresses licence validation, upgrades, and transfers – as well as software updates, auditing, integrity assessment, and protection from reverse engineering and code modification. Further privacy is provided by encrypting the data stored on the blockchain with the end users’ public key.

This system is highly secure as it runs on public key cryptography and uses features such as multi-factor authorisation, removable hardware wallets, and it has no single point of failure. Validating licences on the blockchain makes the process fast and reduces the cost of maintenance. ReSOLV’s functionalities preserve software rights for vendors, prevent piracy, and protect the end user from malware. It also remains flexible, adaptable, and scalable, as it allows the vendor to easily run bespoke software for their licence generation and interactions.

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Software piracy costs in excess of $46 billion US Dollars per year to business and home users. This is an issue that has persisted since the introduction of personal computers. Software Licence Validation techniques have partially ameliorated this problem, but struggle to do so satisfactorily. Many software publishers do not bother to implement these complex piracy solutions and choose instead to work on an honour-based system.

Litchfield and Herbert’s decentralised blockchain Software Licence Validation, ReSOLV, is able to issue software licences to users with unique licence keys that cannot be copied, reused, or regenerated. This solution provides a stable and safe verification platform that is simple, easy, and cost effective for publishers and users. ReSOLV matches and surpasses the strengths of current piracy prevention methods, as well as addressing their shortcomings.

Though software piracy will inevitably be around for as long as we use computers, solutions such as ReSOLV can severely limit their scale and the costs they incur.

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This SciPod is a summary of the paper ‘ReSOLV: Applying Cryptocurrency Blockchain Methods to Enable Global Cross-Platform Software Validation’. [doi.org/10.3390/cryptography2020010](https://doi.org/10.3390/cryptography2020010)

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