

TRUSTING TRUST REVISITED

Preventing Software Supply Chain Attacks
Using Modern Methods

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Seminar
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Institute of Distributed Systems, Ulm University

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~ 18 000 customers^[7]
SolarWinds 2020

> 500 million users^[1]
XcodeGhost 2015

> 100 000 users^[2]
Win32/Induc 2009

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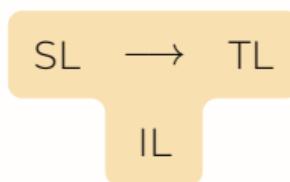
The Attack

[3] McKeeman, Horning und Wortsman: *A Compiler Generator* 1970

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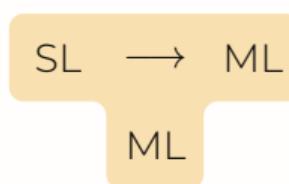


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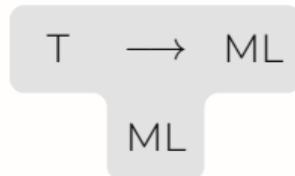
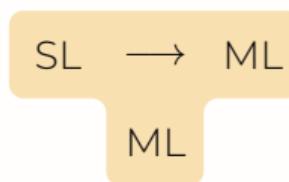


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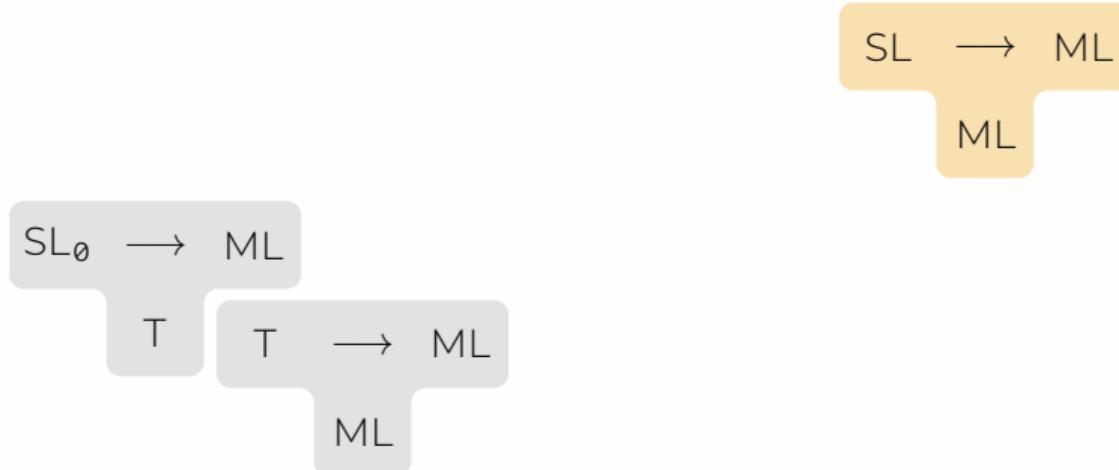


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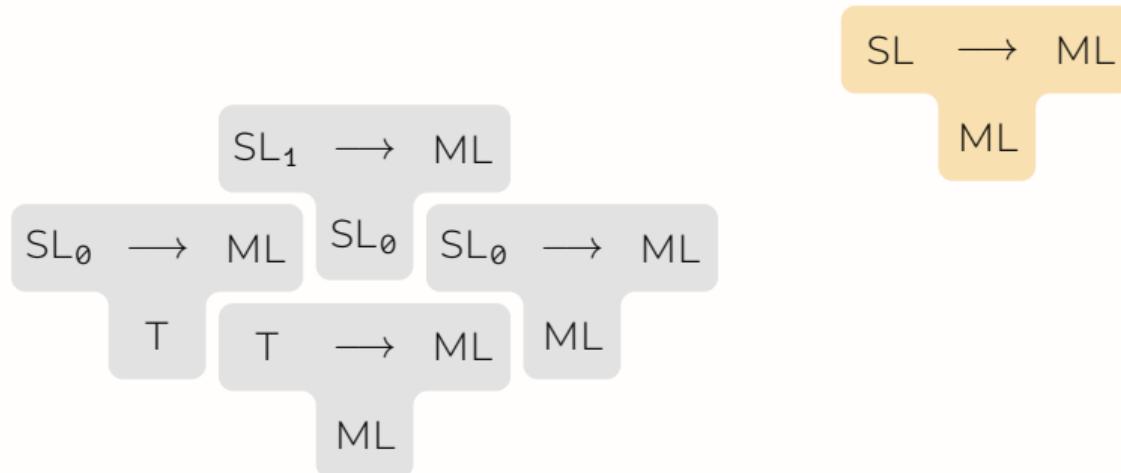


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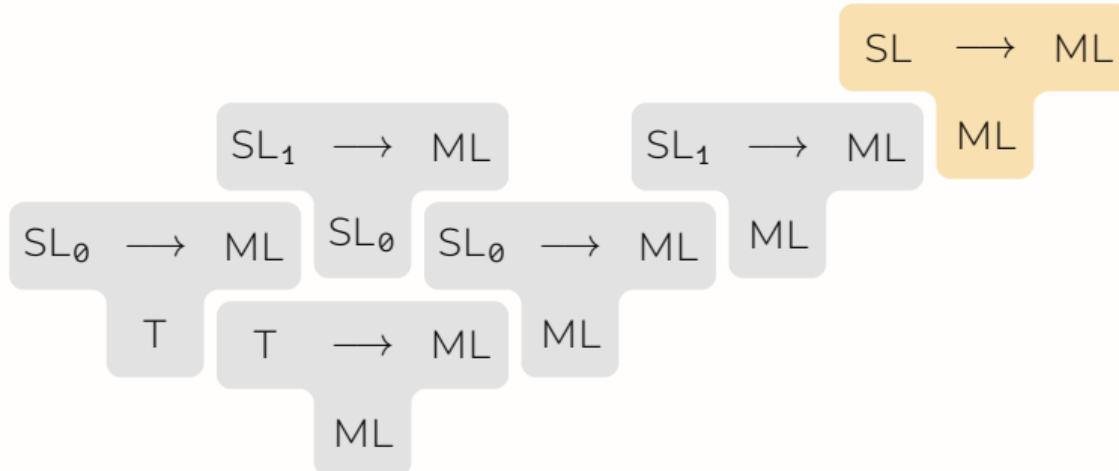


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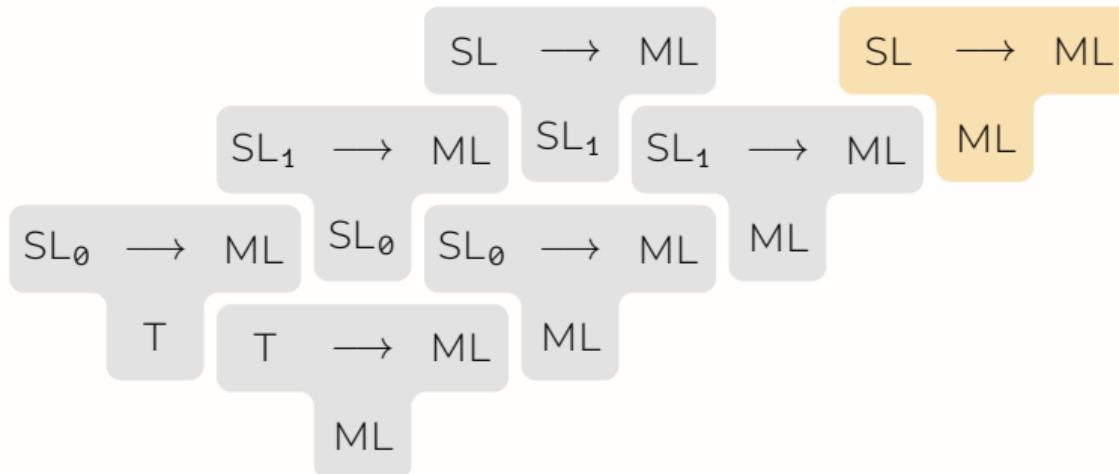


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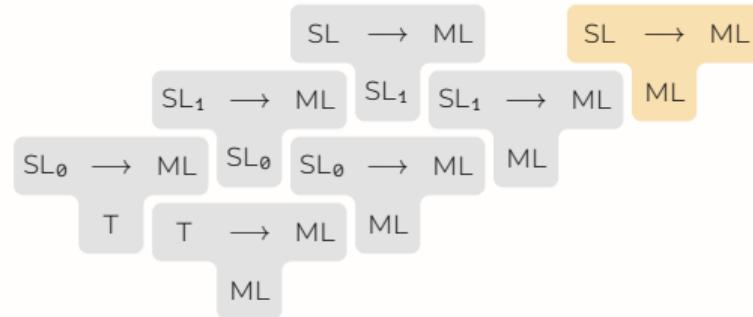


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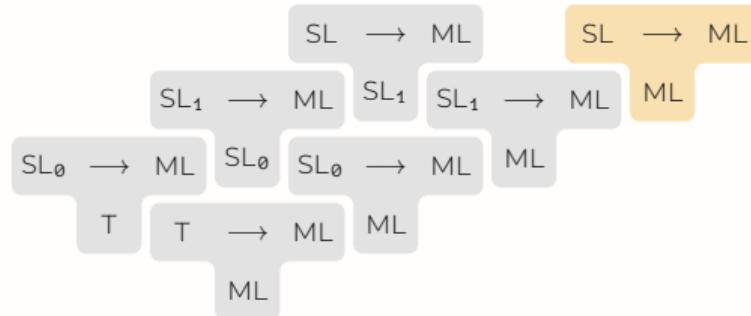


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The Attack



[3] McKeeman, Horning und Wortman: *A Compiler Generator* 1970

`compile()`

[6] Thompson: „Reflections on Trusting Trust“ 1984



Motivation



The Attack



Diverse Double Compiling



CHAINIAC



Conclusion



3

The Attack



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inject = 'inject = %c%s%c
if source contains "compile()":
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Motivation



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Diverse Double Compiling



CHAINIAC

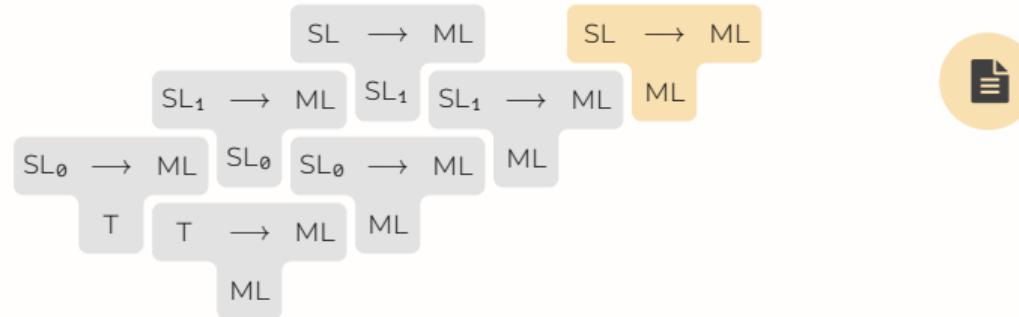


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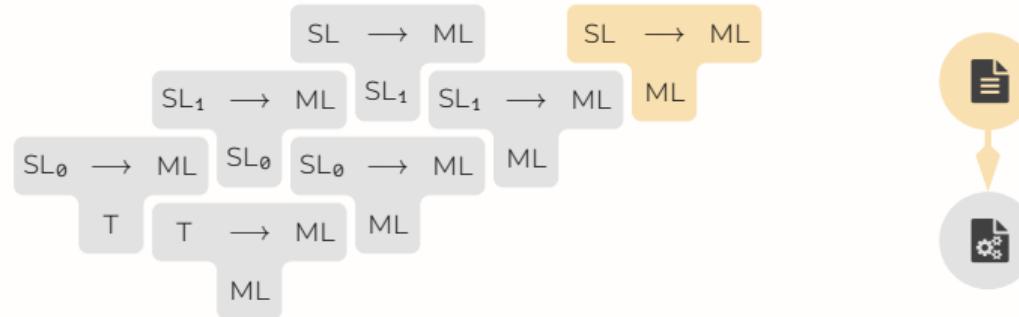
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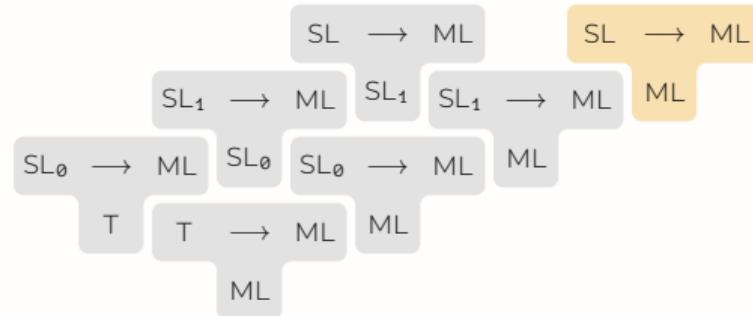
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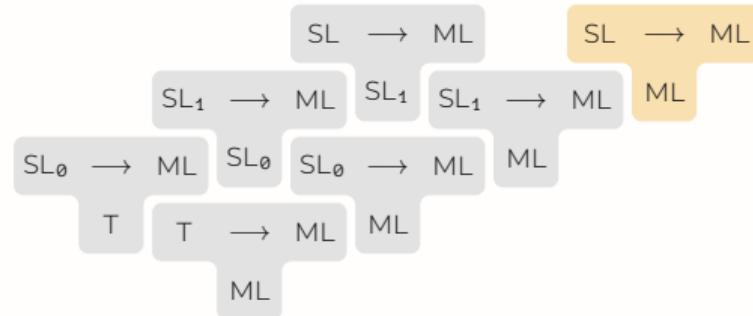
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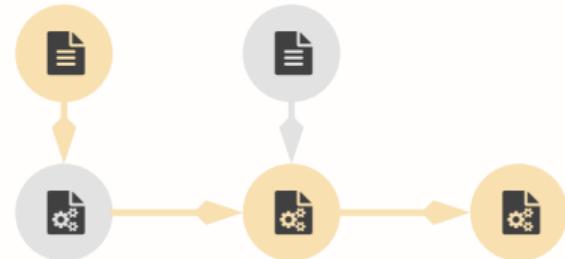
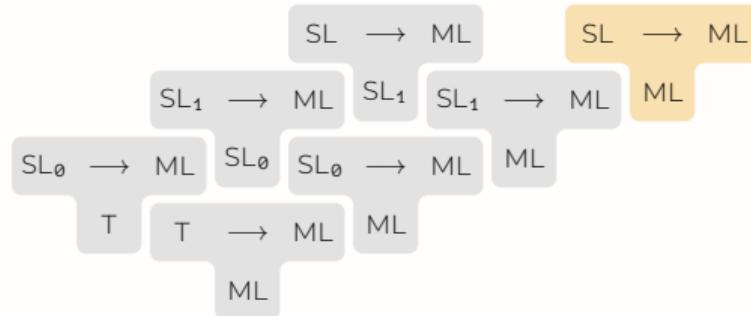
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Diverse Double Compiling

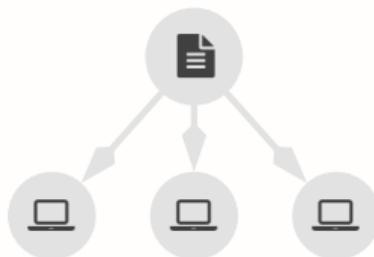
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Diverse Double Compiling



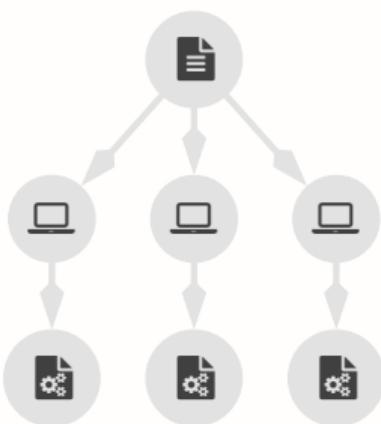
Reproducible

Diverse Double Compiling



Reproducible

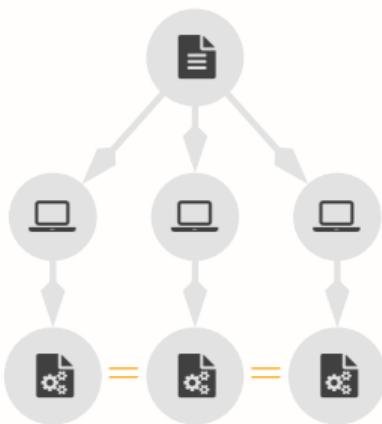
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Reproducible

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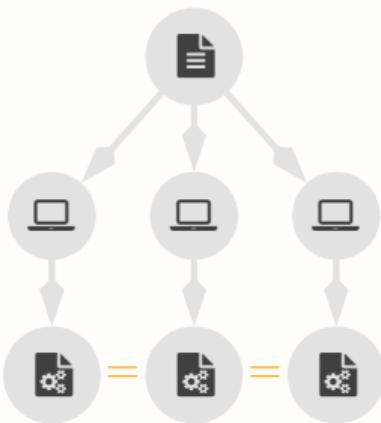
Diverse Double Compiling



Reproducible

4

Diverse Double Compiling



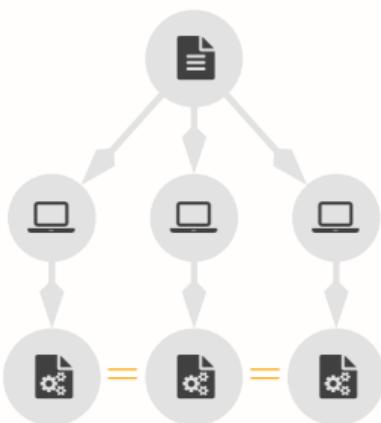
Reproducible

1.



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Diverse Double Compiling

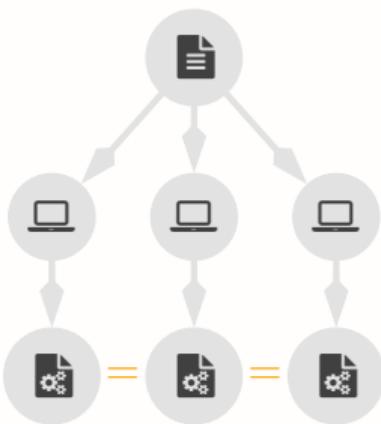


Reproducible



4

Diverse Double Compiling

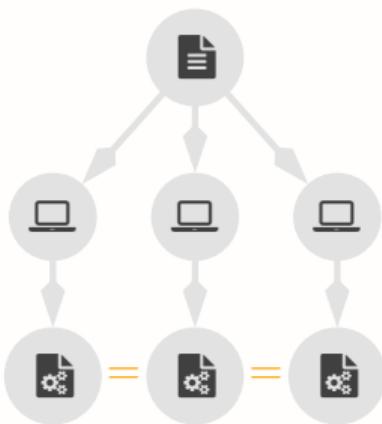


Reproducible



4

Diverse Double Compiling

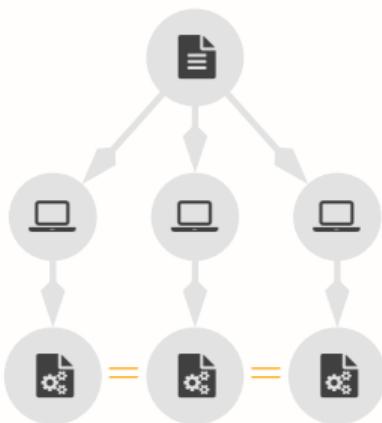


Reproducible

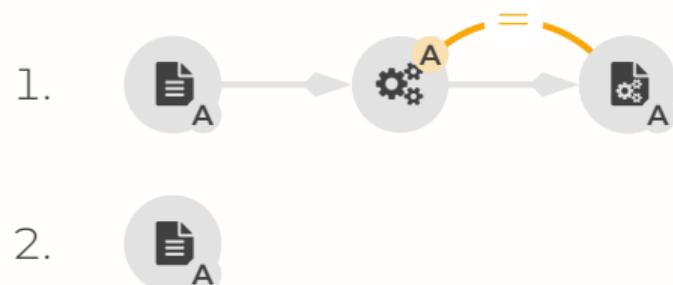


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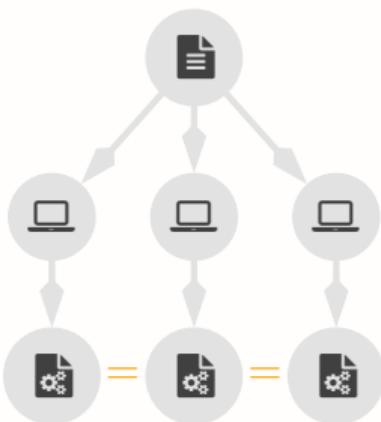


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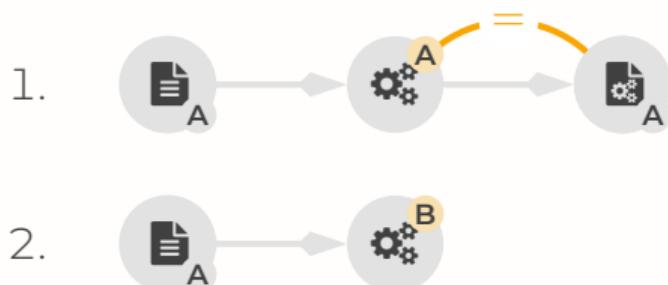


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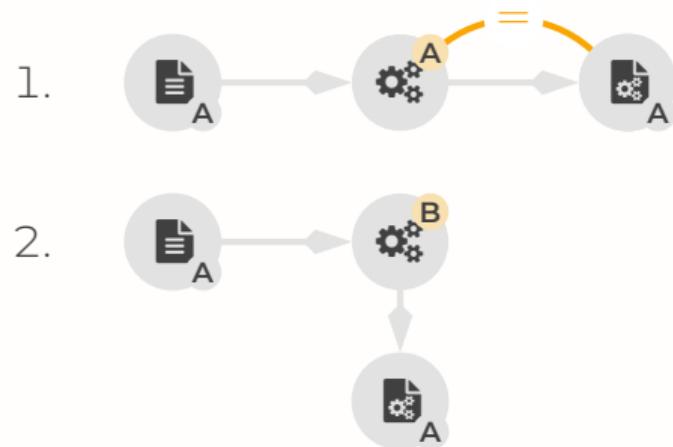
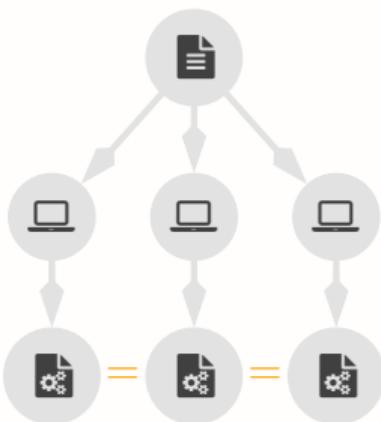


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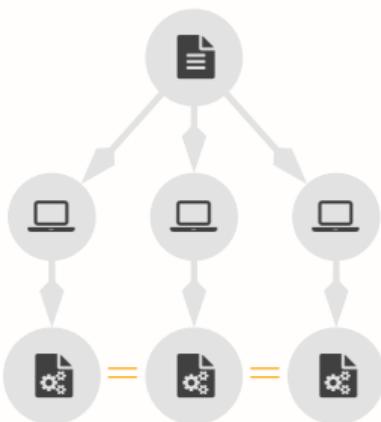
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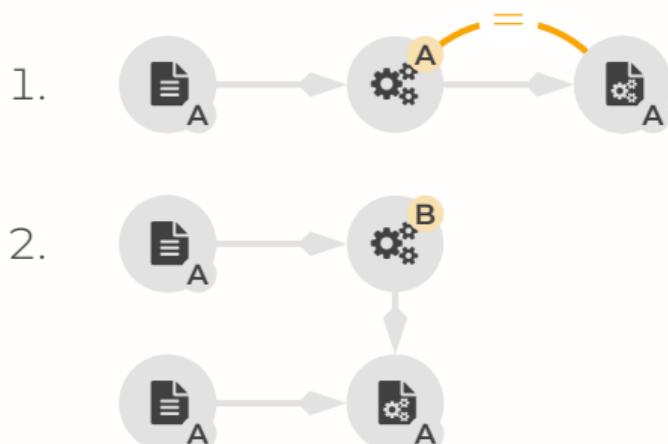


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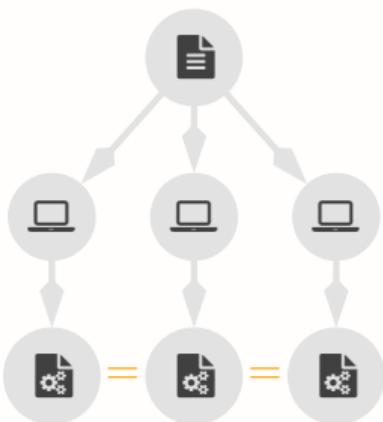


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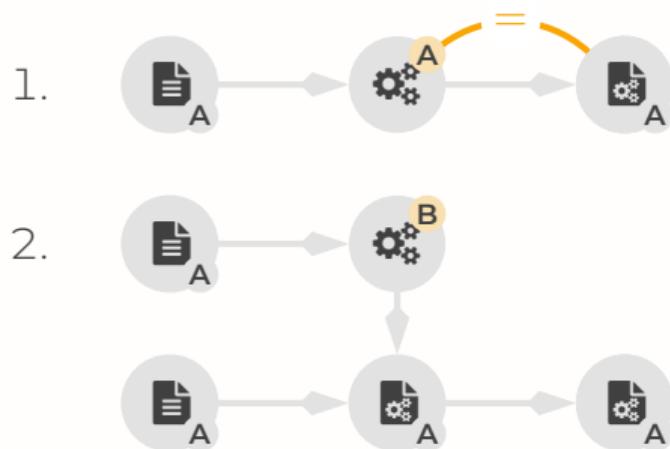


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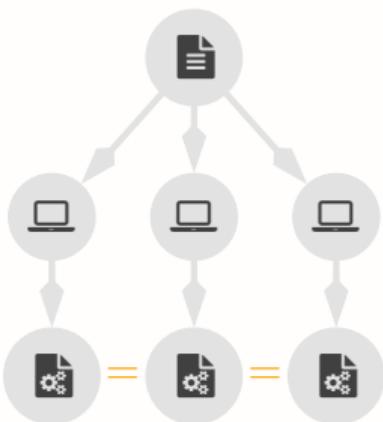


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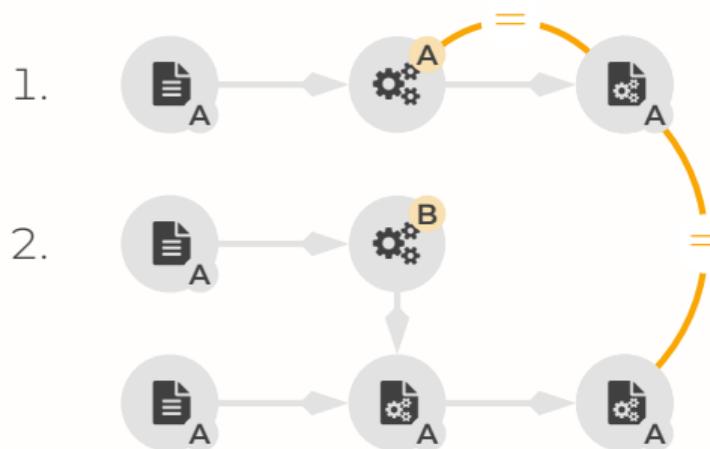


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Reproducible



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CHAINIAC

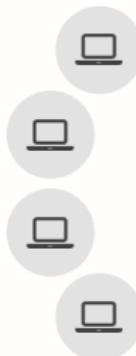
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CHAINIAC



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Developers

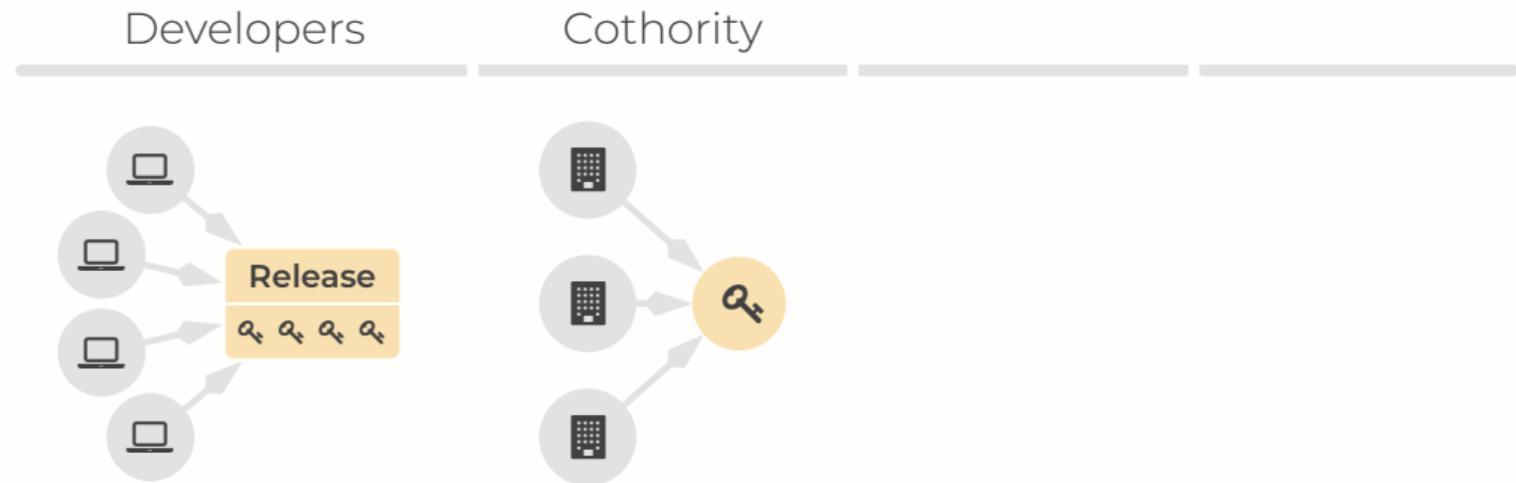


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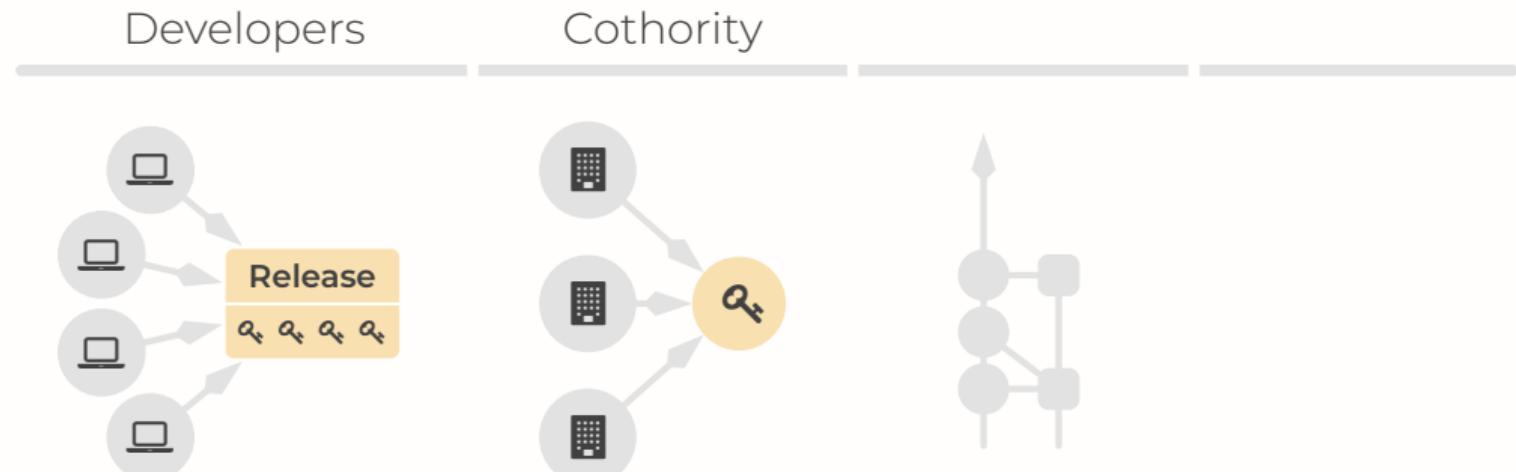
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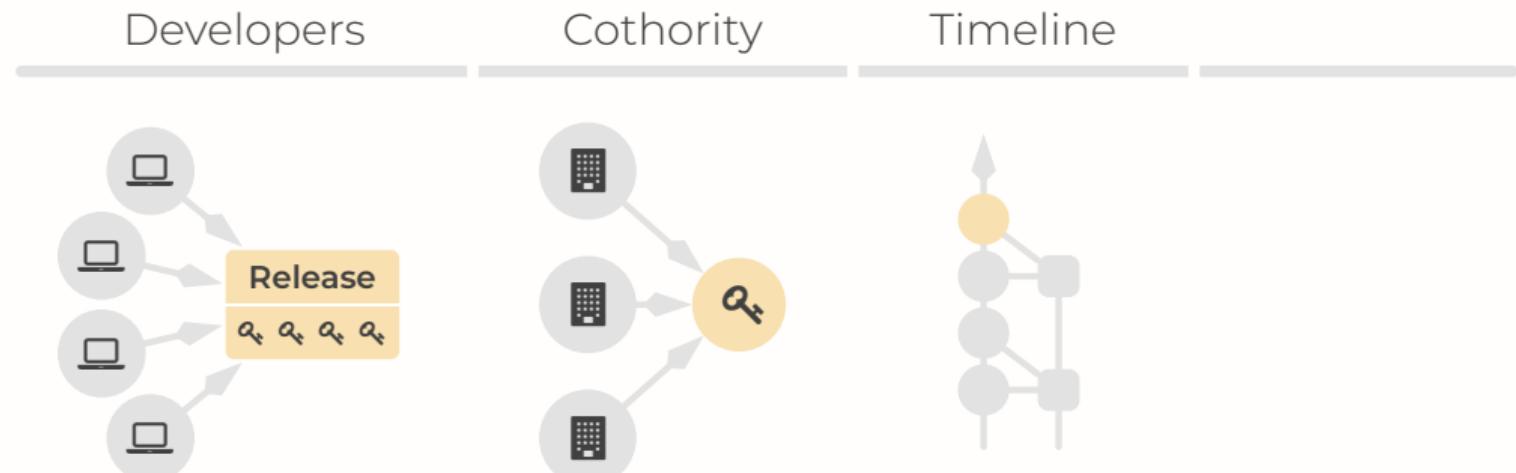
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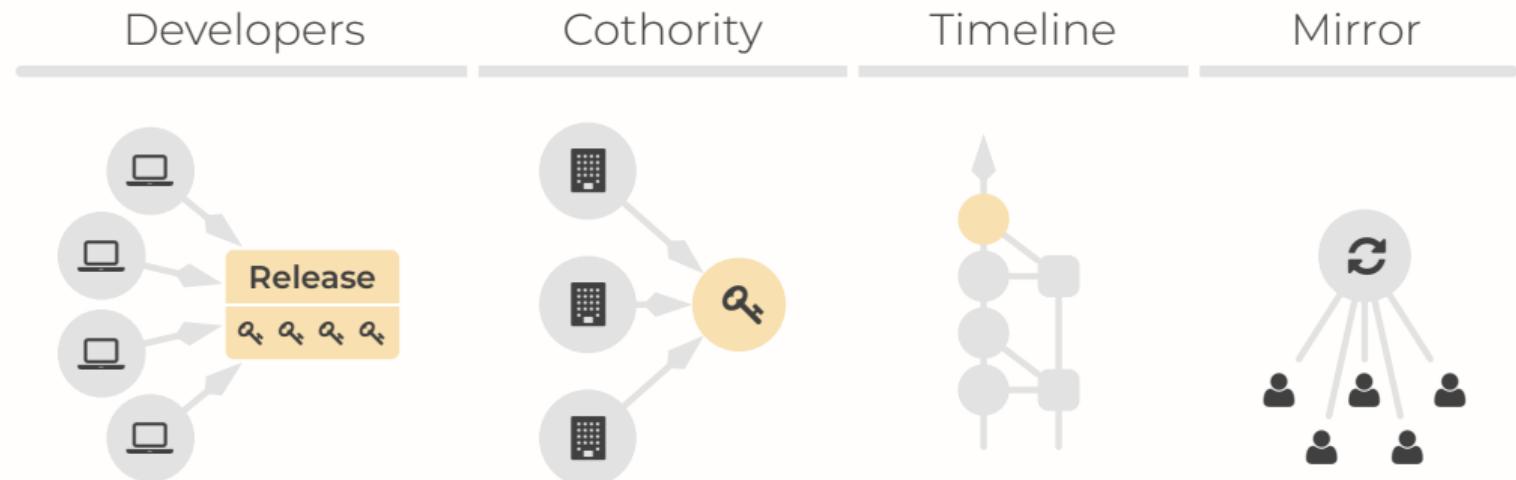
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Conclusion

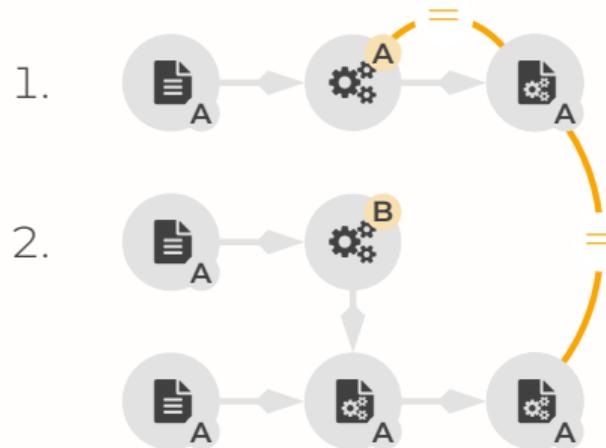
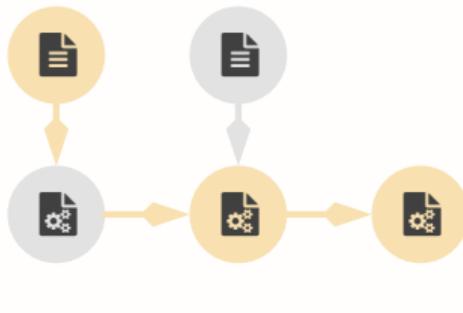
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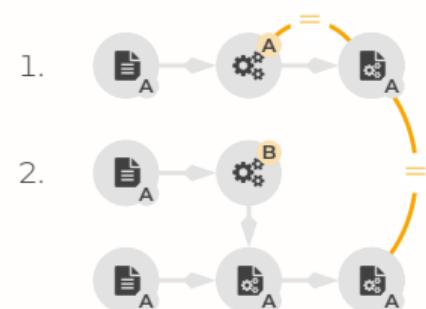
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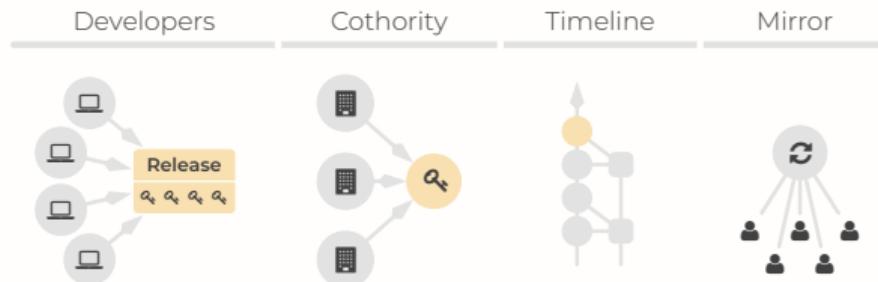
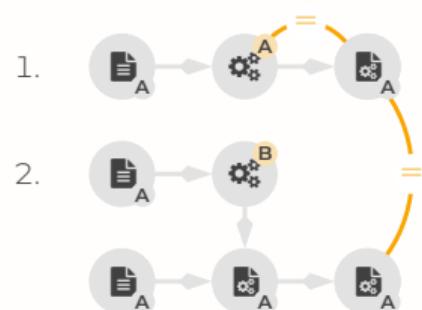
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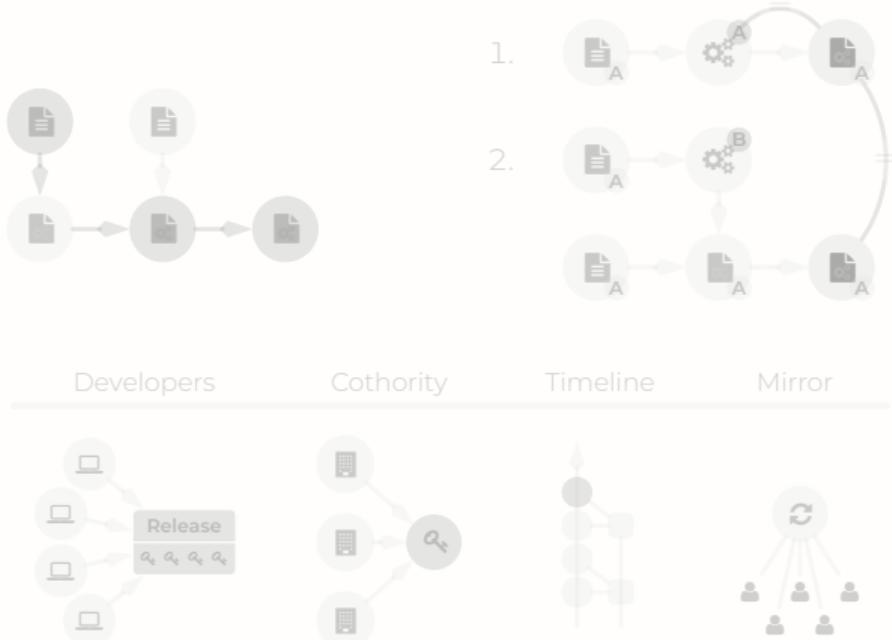
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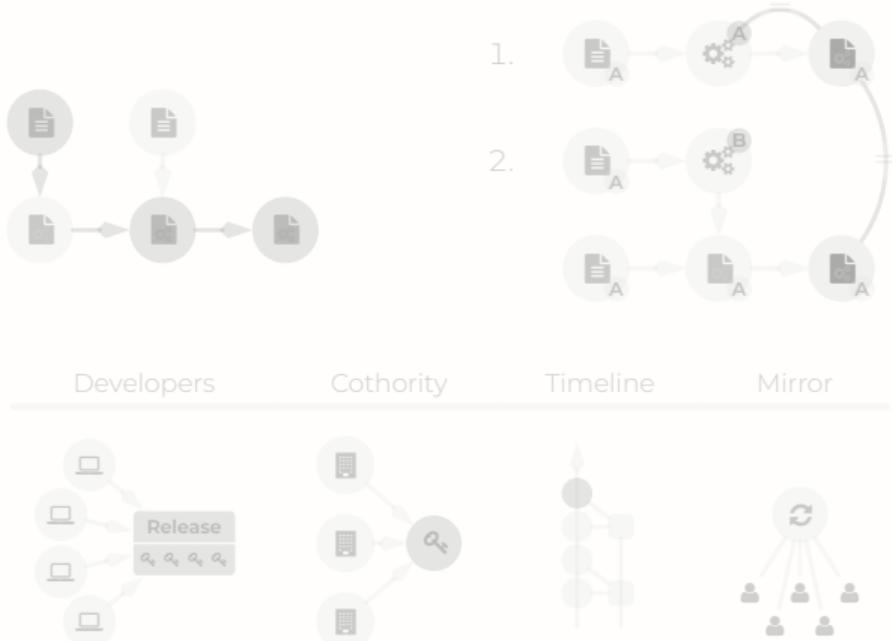
Conclusion



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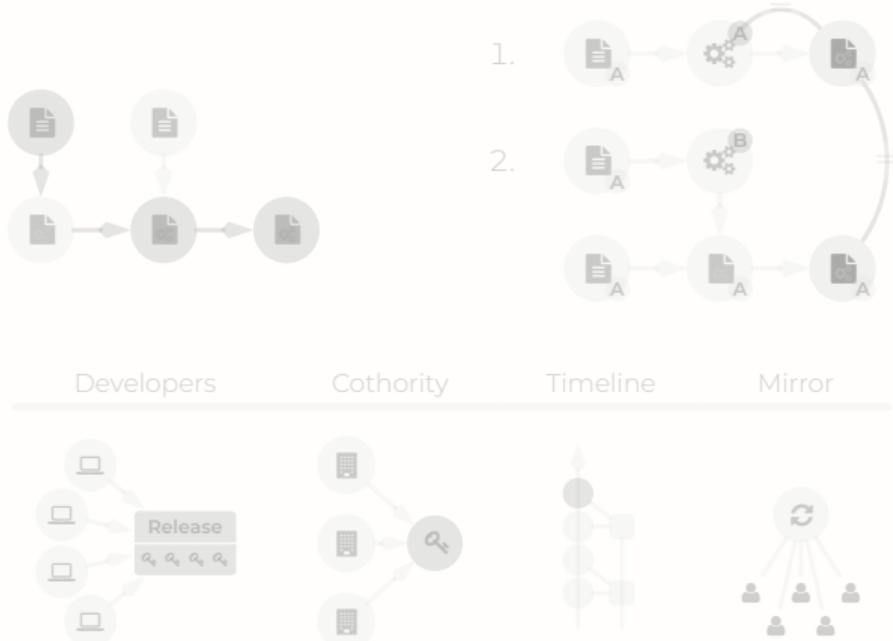
› Reproducible Builds



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Conclusion

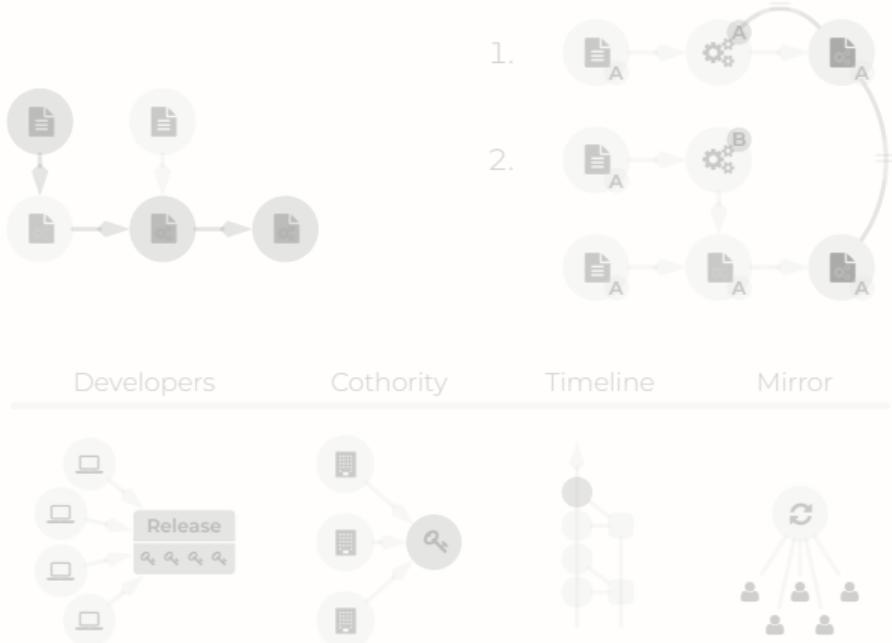
- › Reproducible Builds
- › Tool support



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Conclusion

- › Reproducible Builds
- › Tool support
- › Trust

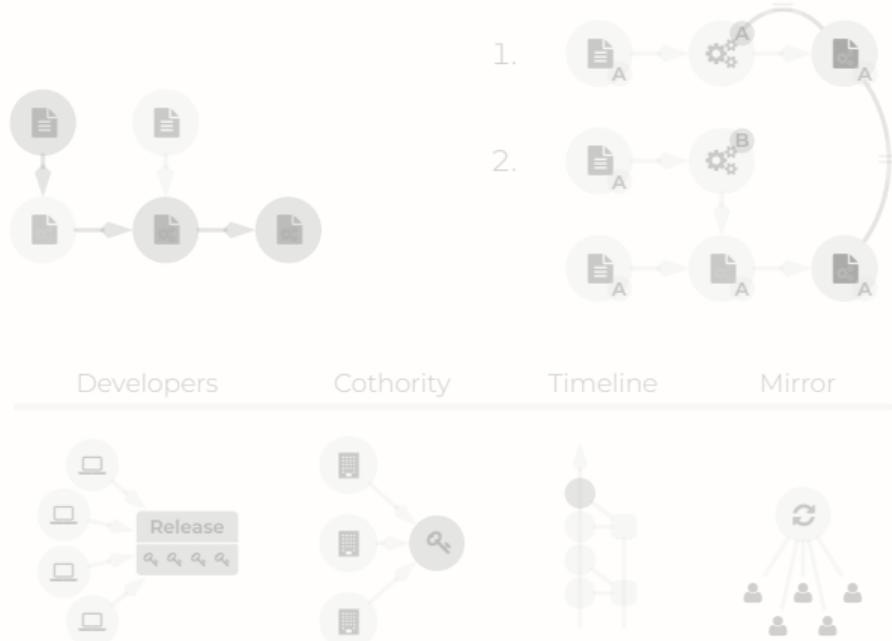


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Conclusion

- › Reproducible Builds
- › Tool support

› Trusting Trust



- [1] Dan Gooding. *Apple scrambles after 40 malicious XcodeGhost apps haunt App Store*. Sep. 2015.
- [2] Robert Lipovský. „Win32/Induc.C: getting noisier in the library“. Dez. 2011.
- [3] William Marshall McKeeman, James J. Horning und David B. Wortman. *A Compiler Generator*. Nov. 1970.
- [4] Kirill Nikitin u. a. „CHAINIAC: Proactive Software-Update Transparency via Collectively Signed Skipchains and Verified Builds“. 2017.
- [5] Software Freedom Conservancy. *Reproducible Builds*. Nov. 2020.
- [6] Ken Thompson. „Reflections on Trusting Trust“. Aug. 1984.
- [7] Olivia von Westernhagen. „Cyberangriffe via SolarWinds-Software – neue Entwicklungen im Überblick“. Dez. 2020.
- [8] David A. Wheeler. „Countering trusting trust through diverse double-compiling“. Dez. 2005.