



# Global Analysis of Dynamic Library Dependencies

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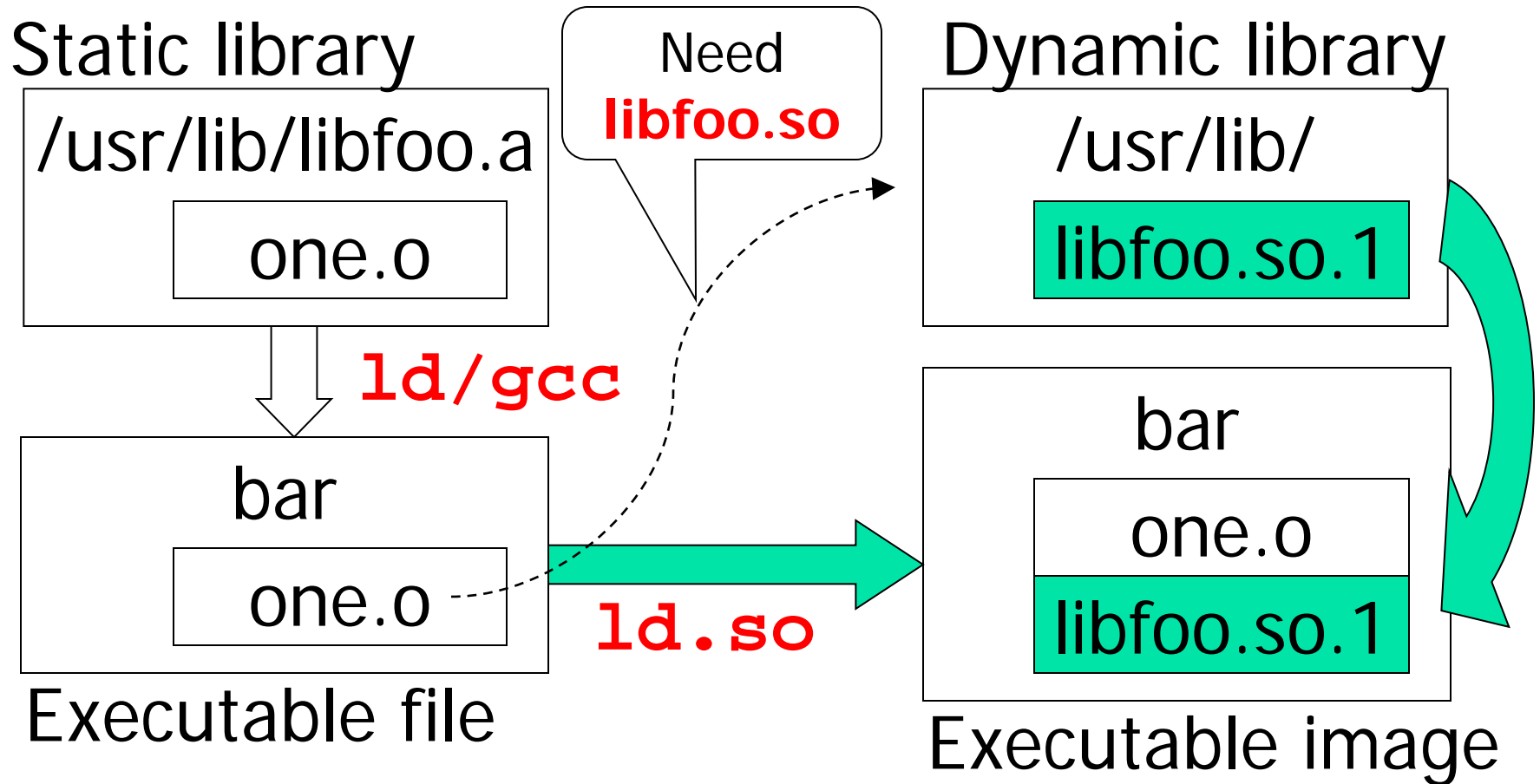
# How to Create Library Dependency Problems

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- Mix package management and compiling.
- Mix local and remote software.
- Compile and use in conflicting environments.
- Don't coordinate software installers.
- Let software outlast installers.
- Wait!



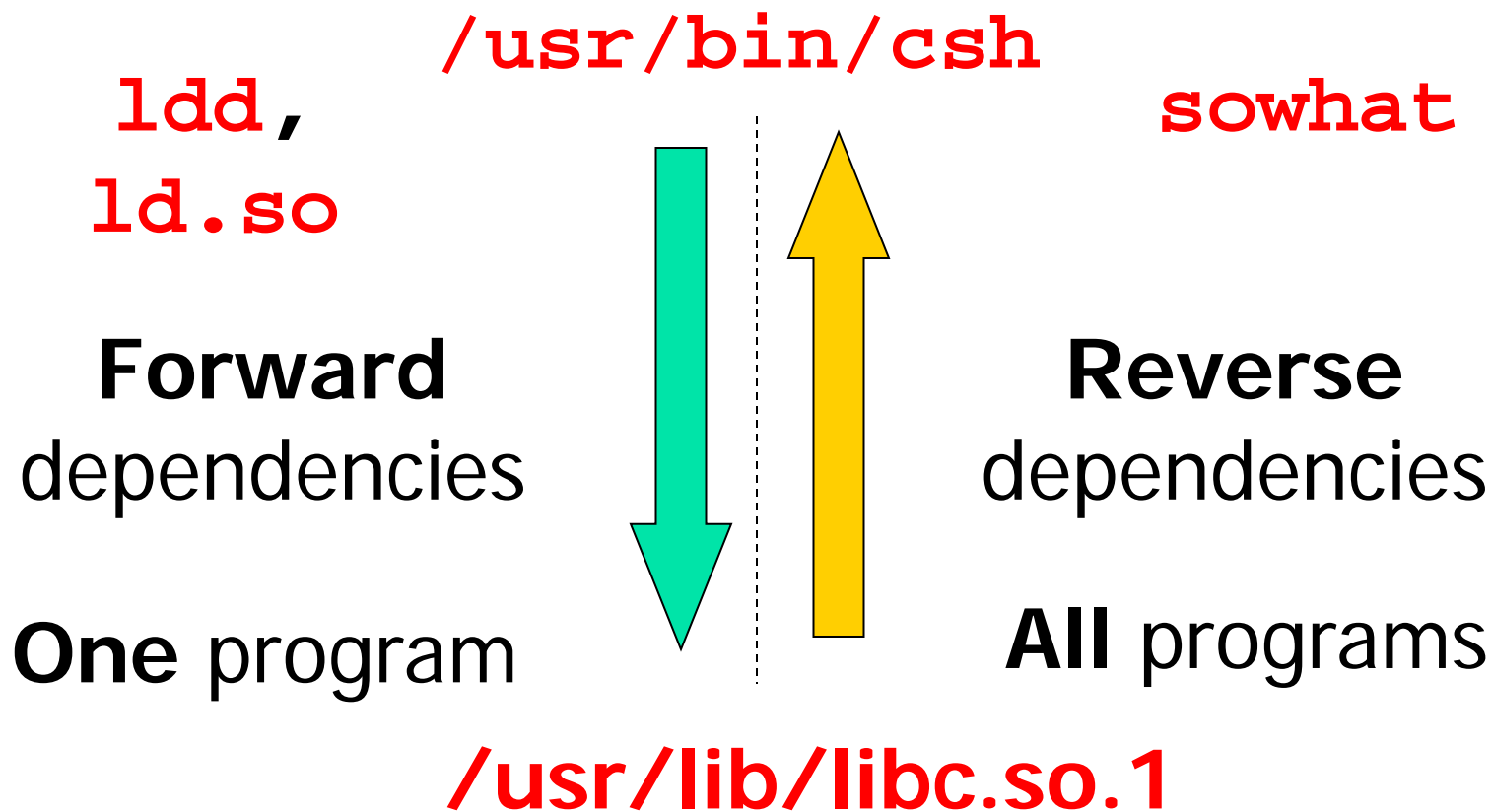
# From Whence Come Library Bindings





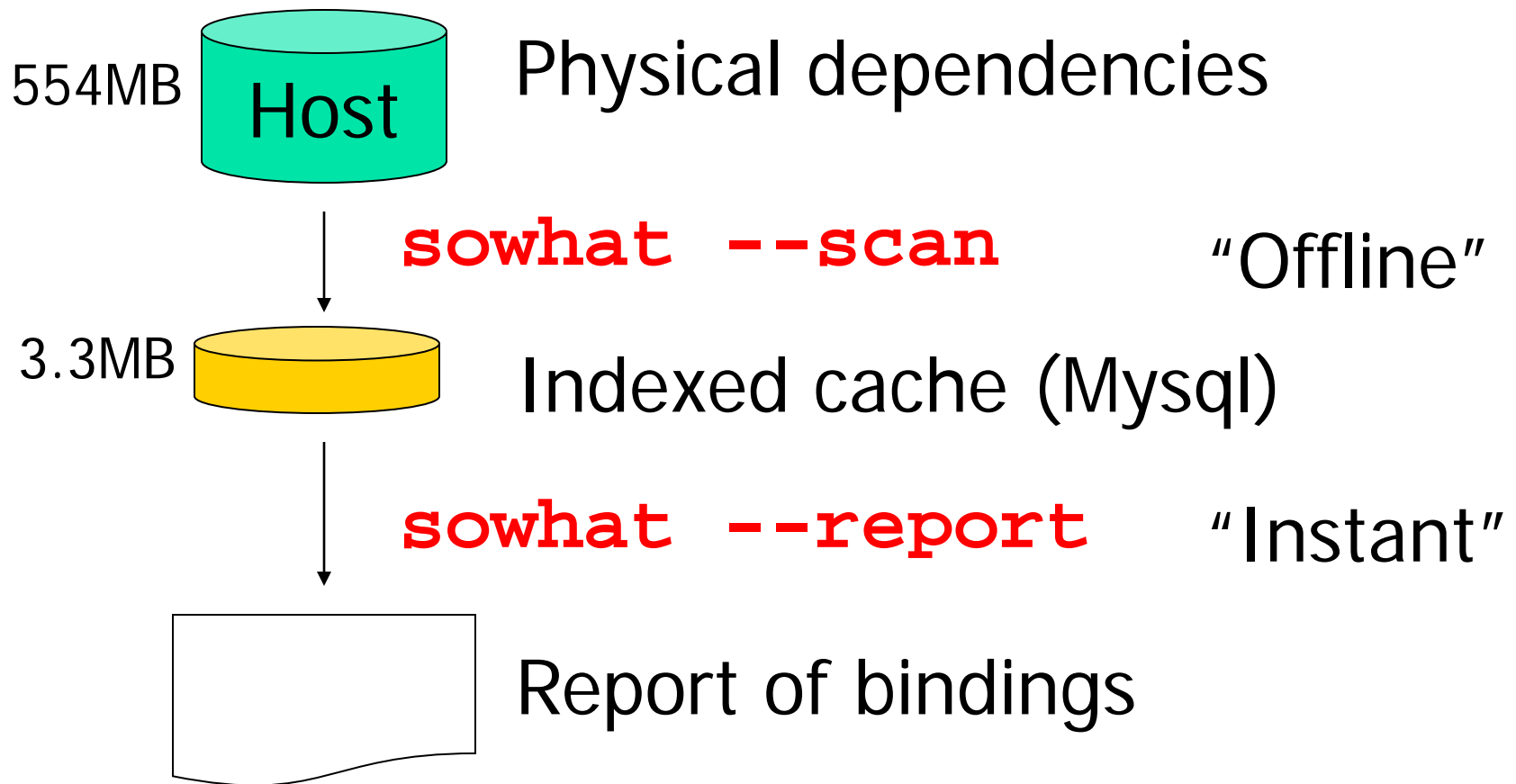
# What Sowhat Does

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# Avoiding Waiting for Results





# Example Output

`/loc/X11/lib/libXaw.so.5.0`

library

LDD `/local/bin/ghostview (libXaw.so.5.0)`

LDD `/local/bin/xarchie (libXaw.so.5.0)`

kind

LDD `/local/bin/xcoloredit (libXaw.so.5.0)`

LDD `/local/bin/xgopher (libXaw.so.5.0)`

LDD `/local/bin/xrn (libXaw.so.5.0)`

LDD `/local/bin/xxgdb (libXaw.so.5.0)`

program

pattern



# Sowhat Uses

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- Analyze impacts of changes.
- Clean up library directories.
- And more...



# Change Analysis

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- Execute:

**sowhat --scan --path**

- Make changes.

**sowhat --diff --path**

- Lists impacts of changes.





# Cleanup

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- Check whether a directory can be deleted:

```
sowhat --report \
```

```
    --to=/path/to/goners
```

- Lists references to contents.



# What Sowhat Exposed

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- Programs outlived libraries by several years!
- Likewise, libraries outlived programs!
- Daemons depended upon remote libraries unavailable at boot!



# Sowhat Also Analyzes

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- Symbolic and hard links.
- References to script handlers (**#!**).
- Configuration file references.
- More to come!



# Performance

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- Sample run on `/local/bin`, `/usr/bin`, `/bin`.
- 554 megabytes of executables.
  - 2022 executable files.
- 3.3 megabytes of cached data.
  - 7929 library dependencies.
  - 1437 symlinks, 226 hardlinks, 499 scripts.
- Overhead =  $3.3/554 = 0.6$  percent.
- Index time: 13 minutes real time, 87.6 cpu-seconds (Sun E-250, `/local/bin` nfs mounted)



# Status and Availability

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- <http://sowhat.sourceforge.net>
- GPL
- Platform: Solaris 7-8, Mysql, Perl with DBI, DBD::Mysql.
- LISA materials:  
<http://www.eecs.tufts.edu/~couch/sowhat>