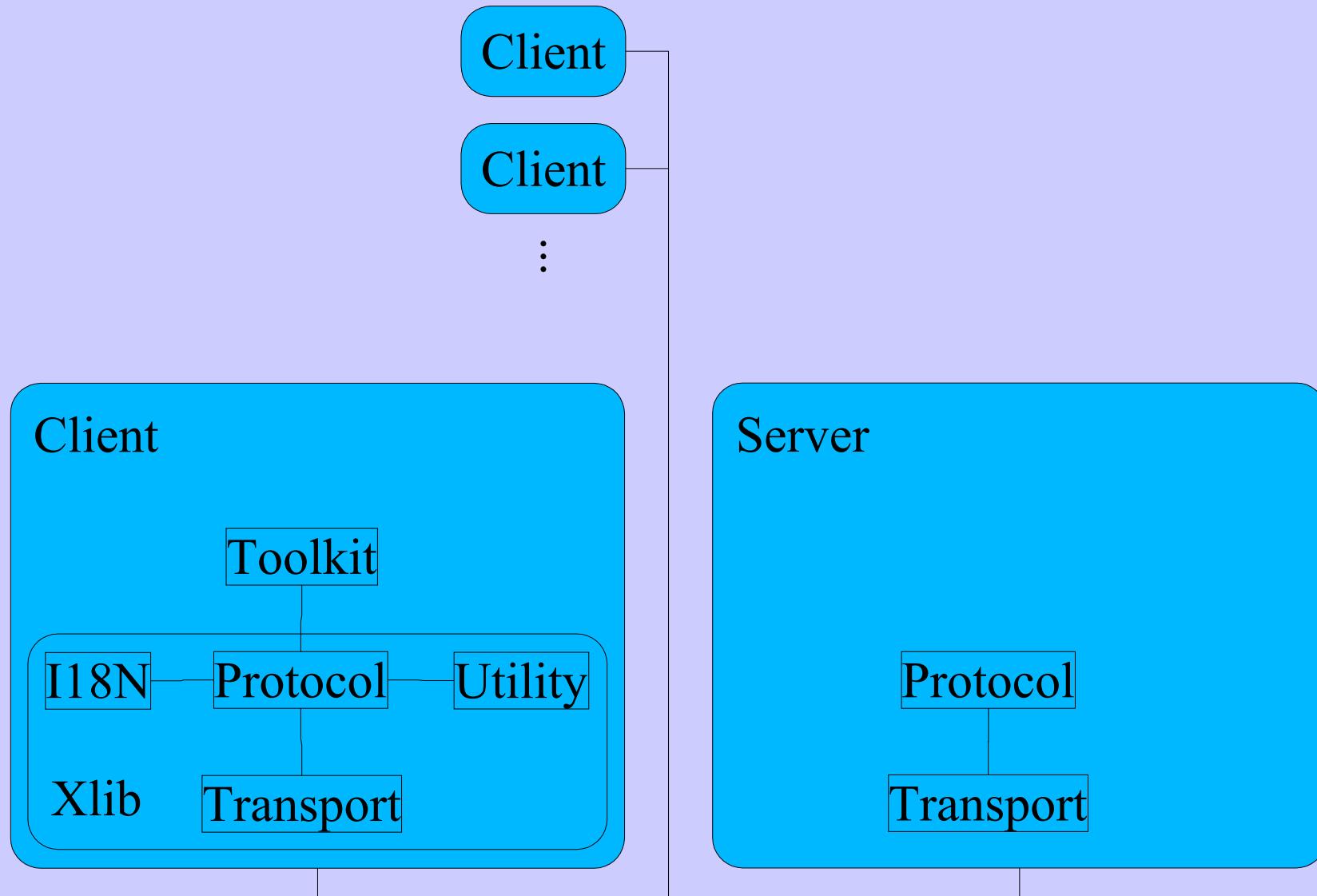


How Xlib Is Implemented (And What We're Doing About It)

Jamey Sharp
Computer Science Department
Portland State University
Portland, OR USA 97207-0751

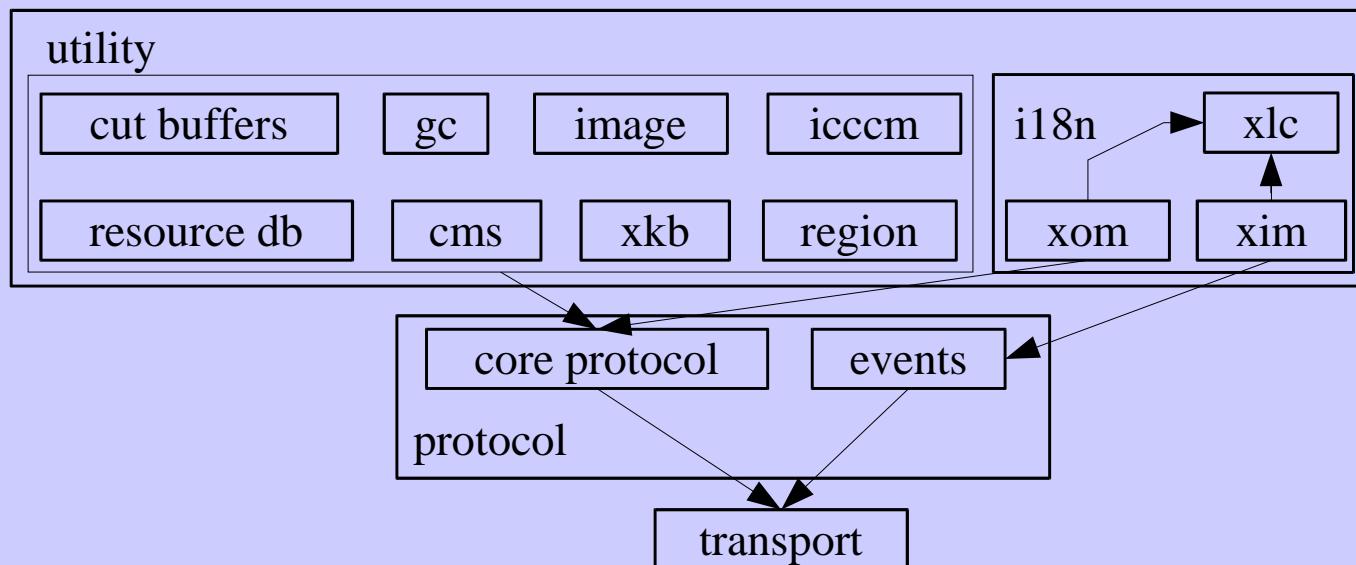
jamey@cs.pdx.edu
<http://xcb.freedesktop.org>

X Window System Architecture



Xlib Architecture

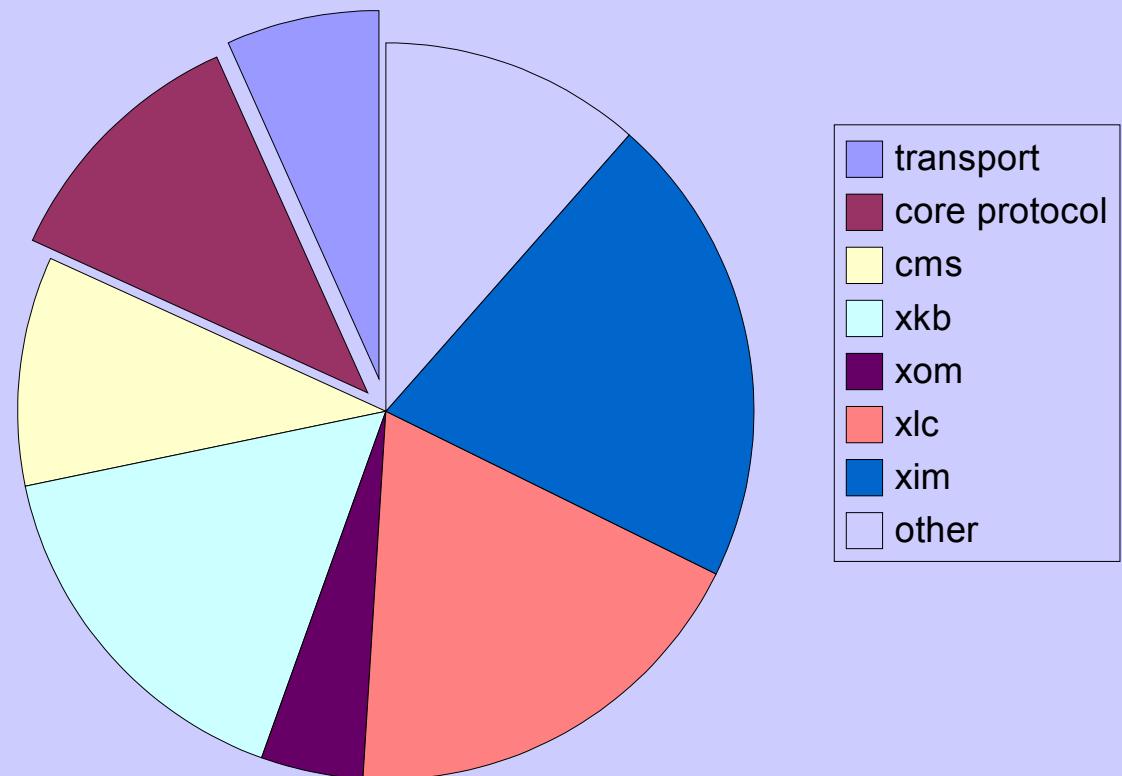
- ◆ Transport layer: conveys requests and responses between client and server
- ◆ Protocol layer: constructs requests and unpacks replies
- ◆ Utilities layer: does everything else



Some Xlib Issues

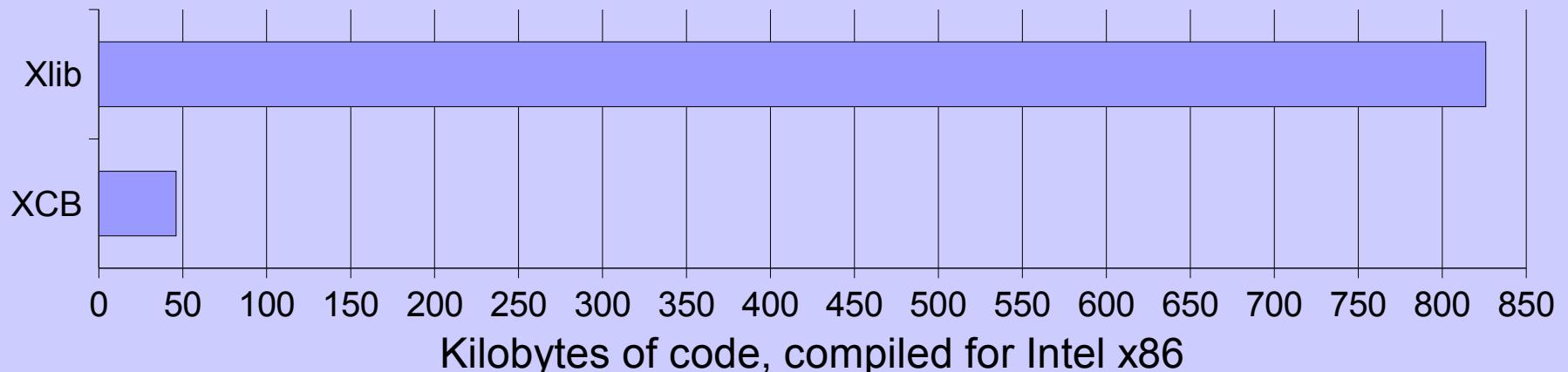
- ◆ Large size
- ◆ Inflexible code
- ◆ Unpredictable behavior
- ◆ Excessive latency
- ◆ Confusing thread support

Xlib Component Sizes



Starting Over: XCB

- ◆ Simpler, smaller implementation
- ◆ Focus on transport, protocol
- ◆ New domain-specific language for X protocol description provides
 - ◆ flexibility
 - ◆ maintainability

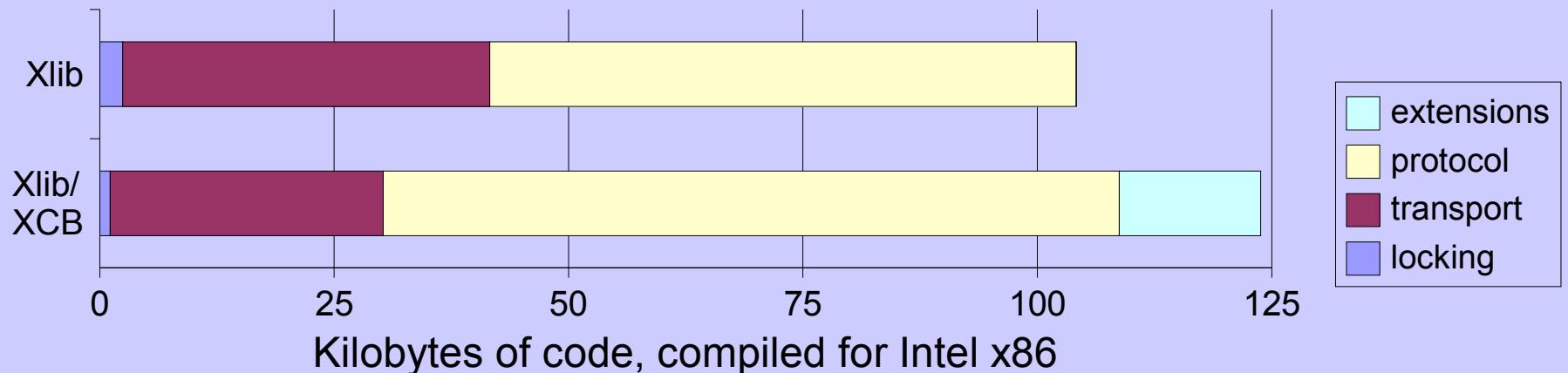


Porting Xlib to XCB

- ◆ Goal: provide a migration path for Xlib-based applications and libraries
- ◆ First try: XCL
 - ◆ Idea: re-implement Xlib's API from scratch using XCB
 - ◆ Problem: Xlib's API is huge
- ◆ Current approach: start migration at bottom
 - ◆ Replace transport and locking with XCB
 - ◆ Prototype implemented in a few days!
 - ◆ Slowly migrate protocol layer to XCB

Results

- ◆ X Test Suite and real workloads confirm substantial correctness; some bugs remain
- ◆ Locking and transport are simpler and smaller; protocol port not yet complete



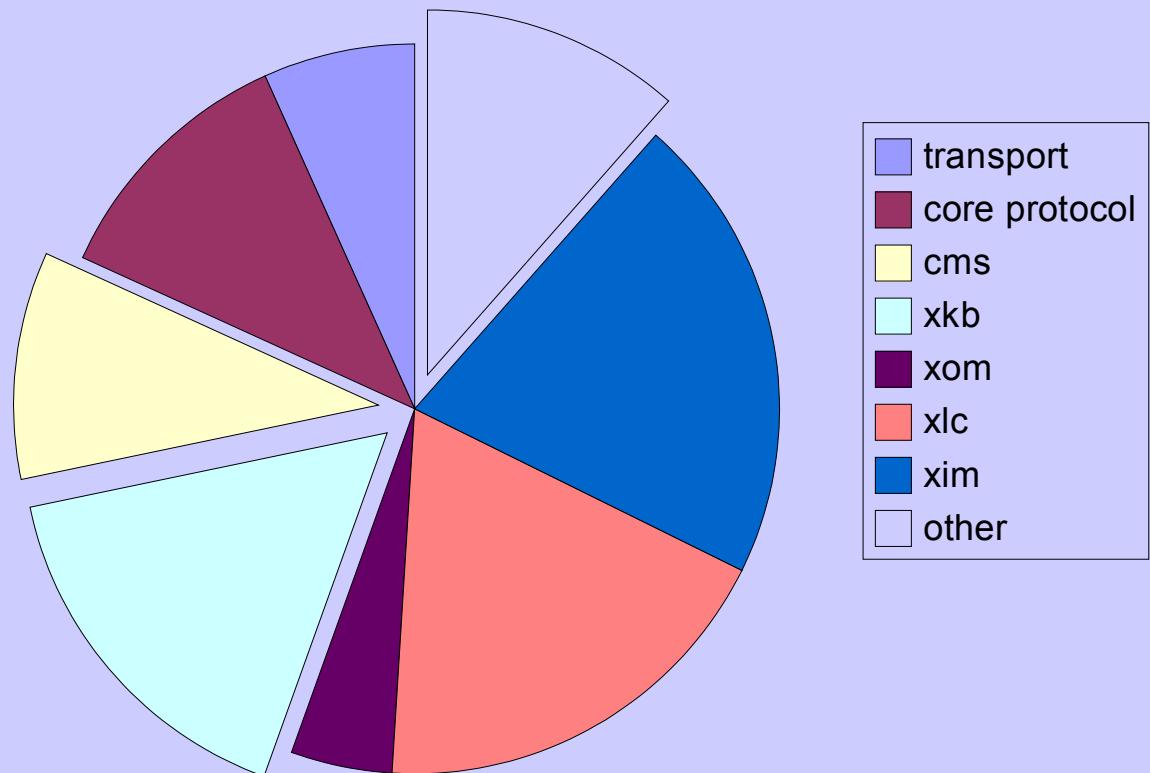
- ◆ Any changes in performance are imperceptible

Other Xlib Projects

Redesigning other Xlib components

- ◆ cms
- ◆ xkb
- ◆ xom/xlc/xim

Xlib Component Sizes



Conclusion

- ◆ Installed size of X client libraries are reduced significantly
- ◆ Clarity, maintainability, and extensibility are improved as well

Acknowledgements

- ◆ Keith Packard helped us comprehend Xlib and the X Window System.
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- ◆ Jim Gettys' continued support of this effort is greatly appreciated.
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- ◆ USENIX

Availability

XCB: <http://xcb.freedesktop.org/>

Xlib: <http://freedesktop.org/Software/X11>