RAPID: Real-time Approximate Ink Display

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Disclaimer

I spend my life working on Xorg and kernel input drivers. There’s an awful lot I don’t know about how the graphics subsystems work 😞

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Issue

Input lag is everywhere
- Brought up several times so far this XDC
- Input, output, and application latency
- Network latency also a potential source

Input lag is noticeable
- Direct-input devices make lag obvious
- Even relatively small levels have negative effects on productivity

Input lag is getting worse
- Major studios are beginning to move to remote/satellite work

GIMP inside GNOME Xorg session on Cintiq Pro 32 (4K / 60Hz). Input driver smoothing disabled
Current Solutions

Hardware
- High refresh-rate displays
- Disable VSYNC
- Dedicated networks

Software
- Input prediction
- Compositor acceleration
- Local cursor
Idea: Basic Inking Protocol

Applicable to local composition
- Application signals intent to use a surface for inking
- Compositor optimizes how it treats the surface (e.g. no buffering or vsync)

Reduces delays from compositor not being set up in an ideal way

Similar to low-latency APIs available on e.g. ChromeOS
Idea: RAPID Protocol

Applicable to local or remote composition
• Application signals intent to use a surface for inking
• Compositor provides optimizations from basic protocol
• Compositor also does its own painting onto overlay plane or framebuffer

Compositor already has access to input events and surface transforms
• Just needs application to supply basic brush attributes

Able to hide both application latency and network latency

Similar to some mobile device APIs that can fast-path input events into ink
Notes: RAPID Protocol

Perfect ink fidelity is not required
• Just providing user feedback about the approximate shape of the path
• Real ink will be showing up in a few dozen milliseconds
• Sequence of “line-to” draws with approximately-correct color and size is fine

Possible Mechanisms
• Damage-erased ink
• Pointer trails
Etcetera

Hunt me down in-person!

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