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Welcome to Ubuntu Developer Day



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uTouch Multitouch and Gestures

Presentation by

Chase Douglas

chase.douglas@canonical.com

Find us in [#ubuntu-touch](#) on Freenode

<https://launchpad.net/utouch>



- Ubuntu 10.10 (Maverick Meerkat)
 - Introduction of the uTouch gesture framework
 - Supports pan, rotation, pinch, and tap
 - Integration of gestures in Unity window manager on Ubuntu Netbook Edition
 - Playground for developers interested in gestures
 - Many new and improved multitouch drivers

Multitouch support in Ubuntu releases



- Ubuntu 11.04 (Natty Narwhal)
 - Full multitouch support through the X window system
- Inclusion of pre-release Xinput 2.1 extension
- Ubuntu will be the first distribution to include multitouch on the desktop
 - Better support for gestures through the uTouch stack
- Integration of gestures and multitouch simultaneously through uTouch
 - Further integration with the Unity window manager
 - Integration into a few key applications:
- Eye of Gnome (Image Viewer)
- Evince (PDF Viewer)
 - Gesture to keycode translation for legacy applications

Multitouch support in Ubuntu releases



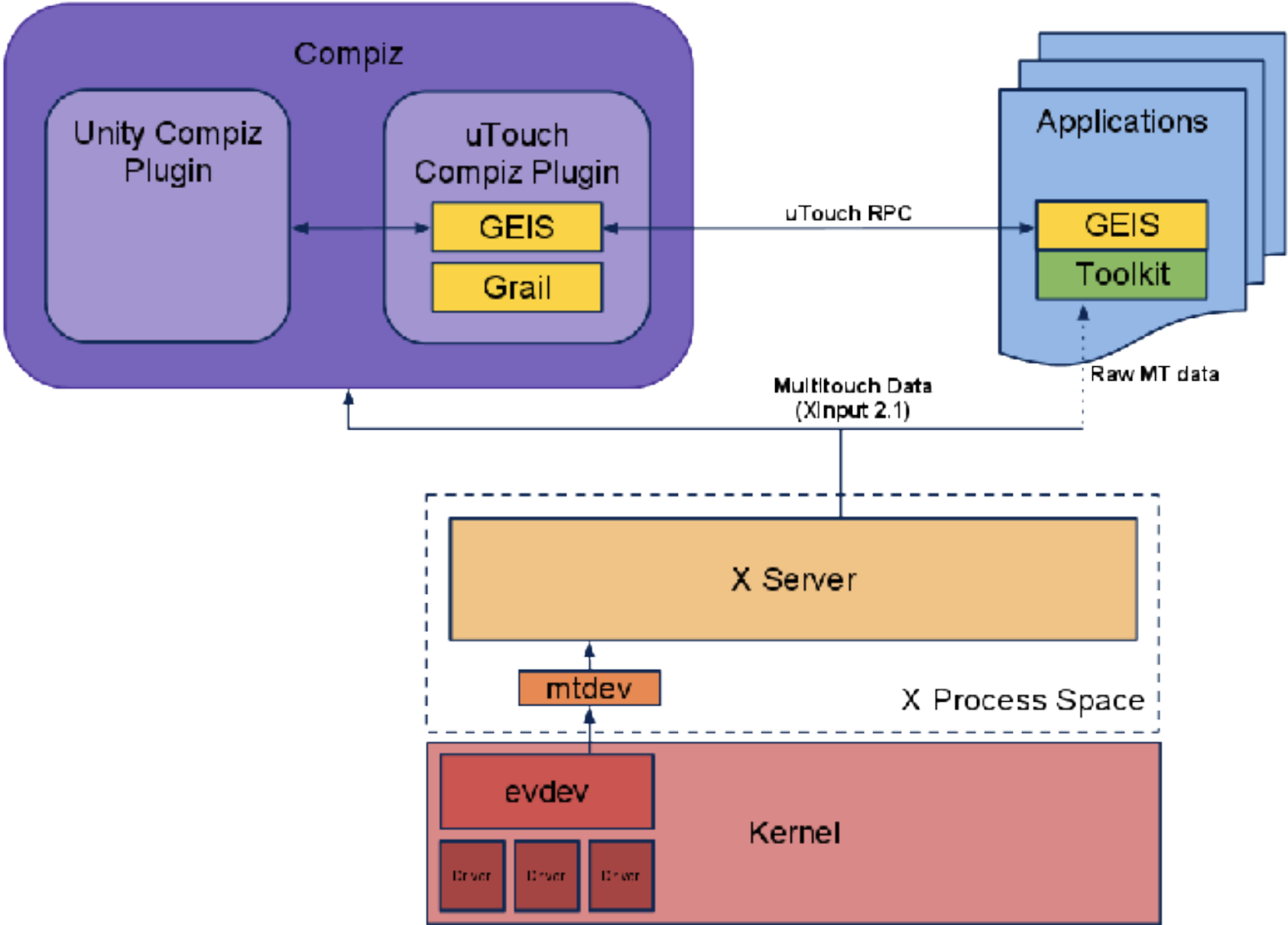
- Plans for Ubuntu 11.10 (O)
 - Official Xinput 2.1 multitouch support
 - Toolkit support for multitouch and gestures (Qt and GTK+)
 - Further refinements of the uTouch stack



Core Software Components

- Architecture Overview
- MTDev
- uTouch-Grail
- uTouch-Geis
- uTouch-Ginn

Core software components – Overview





- MTDev:
 - Multitouch tracking translation library
 - Input: raw tracked/untracked multitouch data
 - Output:
 - Tracked multitouch input data
 - Defuzzed multitouch coordinates
 - Created and maintained by Henrik Rydberg
- uTouch team member
- Linux kernel multitouch maintainer



- uTouch-Grail:
 - Gesture Recognition And Instantiation Library
 - Input:
 - Tracked multitouch touches from XInput 2.1
 - Gesture subscriptions from uTouch-Geis
 - Output:
 - Gesture events if recognized and subscribed by clients
 - Passthrough multitouch input events otherwise



- uTouch-Geis:
 - Gesture Engine Interface Support
 - API for applications to register for gesture events
 - Input:
 - Gesture subscriptions from applications, passed to uTouch-Grail
 - Gesture and multitouch events from uTouch-Grail
 - Output:
 - Gesture and multitouch events to applications
- Documentation and API available at:
<https://wiki.ubuntu.com/Multitouch/APIs/GEIS/1.0Spec>



- Many applications could use multitouch gestures today
- Most will not be integrated with uTouch at first
- Solution: translate gestures into key codes
- Example: Inkscape (a drawing application)
 - Two finger pinch translated to ctrl-'+' and ctrl-'-' for zooming
 - Two finger drag translated to the up, down, left, and right keys for scrolling
- uTouch-Ginn uses configuration files to:
 - Find specific applications
 - Listen for gestures occurring over the application windows
 - Inject key events for corresponding gestures



X.org Multitouch

- History
- Issues
- Solution

X multitouch support – History



- X.org is a window system based on the X11 specification
- X.org is the common window system for all Linux distributions
- Originally (way back in the 1980's), it only supported one keyboard and one mouse
- The XInput extension allows for multiple keyboards and mice simultaneously
 - Also allows for multiple cursors on screen
- X input events are sent to applications (clients) who select for the events on certain windows



- X pointing devices are mapped to cursors on screen
- X cursors are not very dynamic
- Touch input is very dynamic!
 - Example:
- You have one cursor on the screen
- You touch the screen with two fingers
- Should a second cursor be created for the second touch?
- Should the second cursor be destroyed when the second touch is lifted?
- Conclusion: Touch input should not be mapped to X cursors.

X.org multitouch – Solution



- Touch events are separate from pointer events
- Each physical contact has an associated touch ID
- A touch has a lifetime:
 - A touch begin event
 - Multiple touch motion events
 - A touch end event
- Some touches may be used for traditional pointer emulation
 - Details still being worked out



- Where are events sent?
 - Two different type of devices:
- Direct devices (touchscreens)
- Indirect devices (touchpads)
 - Direct touches are sent to windows beneath the touches on the screen
 - Indirect touches are sent to the window under the mouse cursor



Hardware Support

- Ubuntu 10.10 (Maverick Meerkat)
- Ubuntu 11.04 (Natty Narwhal)

Hardware Support – 10.10 (Maverick Meerkat)



- Unity shell supports up to four touch gestures
- N-Trig: four or six touch touchscreen
- Apple
 - Magic Trackpad: ten touch trackpad
 - Unibody Macbooks: ten touch trackpad
 - Magic Mouse: four touch surface
- Wacom devices: two touch touchscreen and trackpads
- 3M: 20 touch touchscreen
- Cando: two touch touchscreens
- eGalax: two touch touchscreens
- “Fake” support for single touch Synaptics and similar trackpads



- Semi-MT support for Synaptics Clickpad multitouch trackpads
 - These trackpads give a bounding box and number of touches up to three
- NextWindow touchscreens
 - Support provided externally by NextWindow at <http://launchpad.net/nwfermi>
- More drivers developed upstream in the Linux kernel project



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Thank You