

# Supporting multi-touch in Linux

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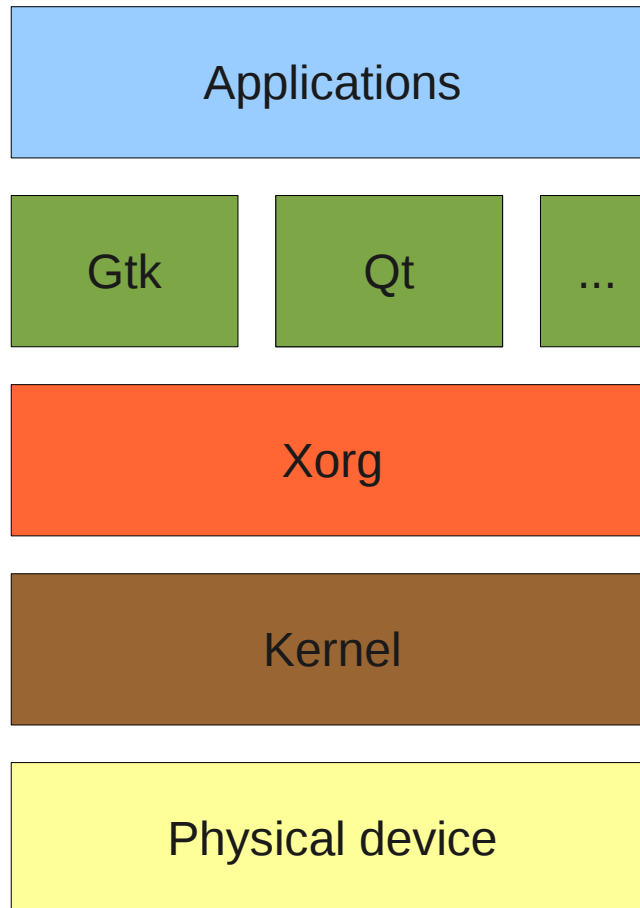
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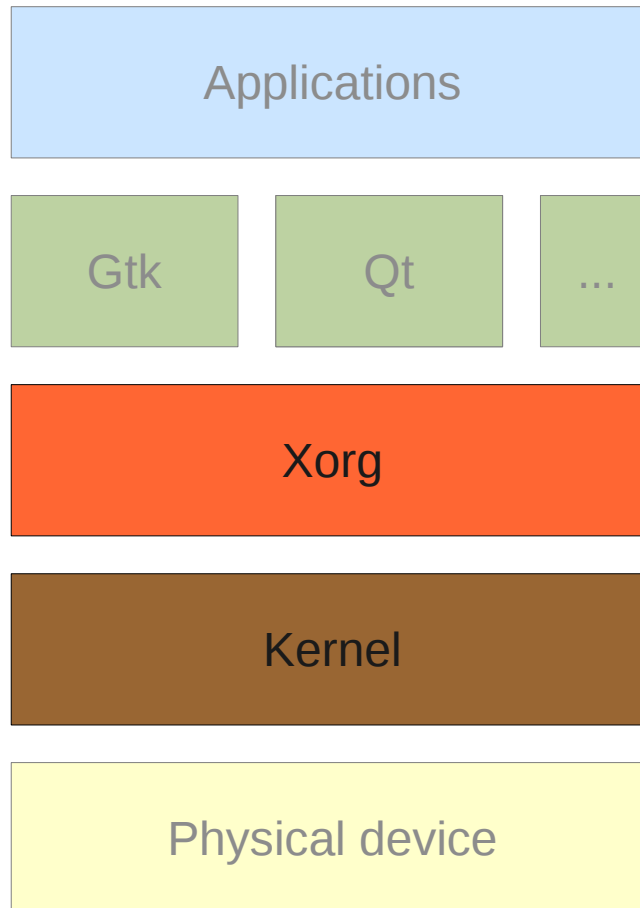
[stephane.chatty@enac.fr](mailto:stephane.chatty@enac.fr)







# The Linux input « stack »



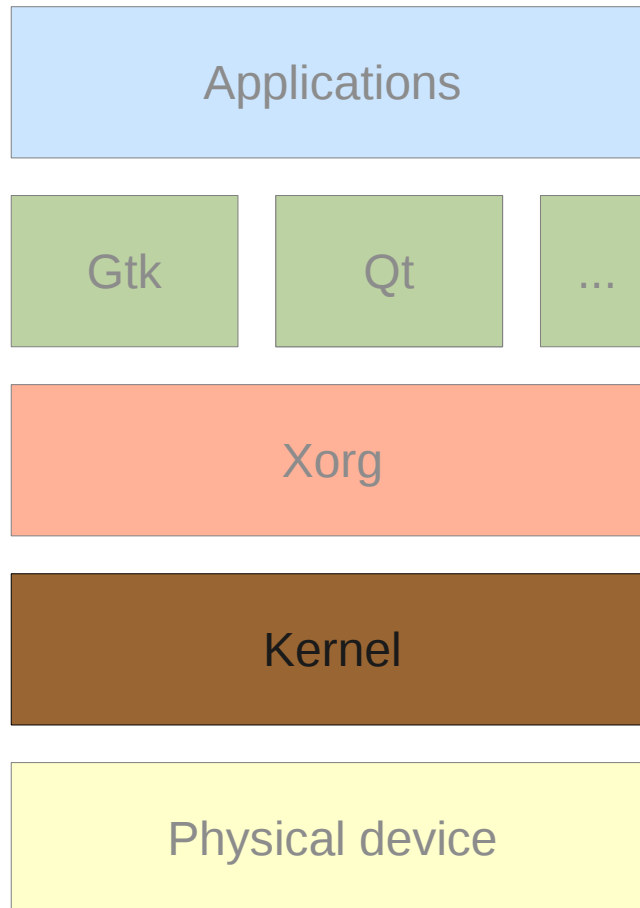
# The Linux input « stack »



# The current state

Operating System	Microsoft Windows	MacOS X	Android	Linux
Multitouch support	 Only for fullscreen applications	 Only for fullscreen applications	 Only for fullscreen applications	 Only in the kernel

# The kernel part



# Before 2.6.30 (< June 2009)

- The hid input device can connect to the station
  - Rely on the evdev protocol:
    - The device sends each modification of each field
    - Then, the device sends a Sync event
- ⇒ **can not handle multi-touch**

```
...
Event: time 1276111545.240104, type 2 (Relative), code 0 (X), value -1
Event: time 1276111545.240175, ----- Report Sync -----
Event: time 1276111546.856145, type 2 (Relative), code 8 (Wheel), value -1
Event: time 1276111546.856210, ----- Report Sync -----
Event: time 1276111549.560198, type 2 (Relative), code 0 (X), value -1
Event: time 1276111549.560208, type 2 (Relative), code 1 (Y), value -2
Event: time 1276111549.560269, ----- Report Sync -----
Event: time 1276111549.568184, type 2 (Relative), code 1 (Y), value -1
Event: time 1276111549.568247, ----- Report Sync -----
Event: time 1276111549.584180, type 2 (Relative), code 0 (X), value -1
Event: time 1276111549.584245, ----- Report Sync -----
...
```

## 2.6.30 kernel (10 June 2009)

- Introduction of MT\_EVENTS

First linux multi-touch protocol

- It is now possible to send more than one time each MT\_field
- Introduction of SYN\_MT\_REPORT

```
...
Event: time 1276112211.400675, type 3 (Absolute), code 57 (Tracking ID), value 2
Event: time 1276112211.400692, type 3 (Absolute), code 53 (Position X), value 395
Event: time 1276112211.400695, type 3 (Absolute), code 54 (Position Y), value 1250
Event: time 1276112211.400711, ----- Config Sync -----
Event: time 1276112211.400781, type 3 (Absolute), code 57 (Tracking ID), value 3
Event: time 1276112211.400783, type 3 (Absolute), code 53 (Position X), value 710
Event: time 1276112211.400785, type 3 (Absolute), code 54 (Position Y), value 1059
Event: time 1276112211.400793, ----- Config Sync -----
Event: time 1276112211.401027, ----- Report Sync -----
...
```

# Until 2.6.34

- 7 kernel drivers (hi-3m-pct, hid-cando, hid-egalax, hid-mosart, hid-ntrig, hid-quanta, hid-stantum)
- Each hardware can have its own interpretation of the hid norm  
(the norm is too lazy)
- Touchscreen emulation



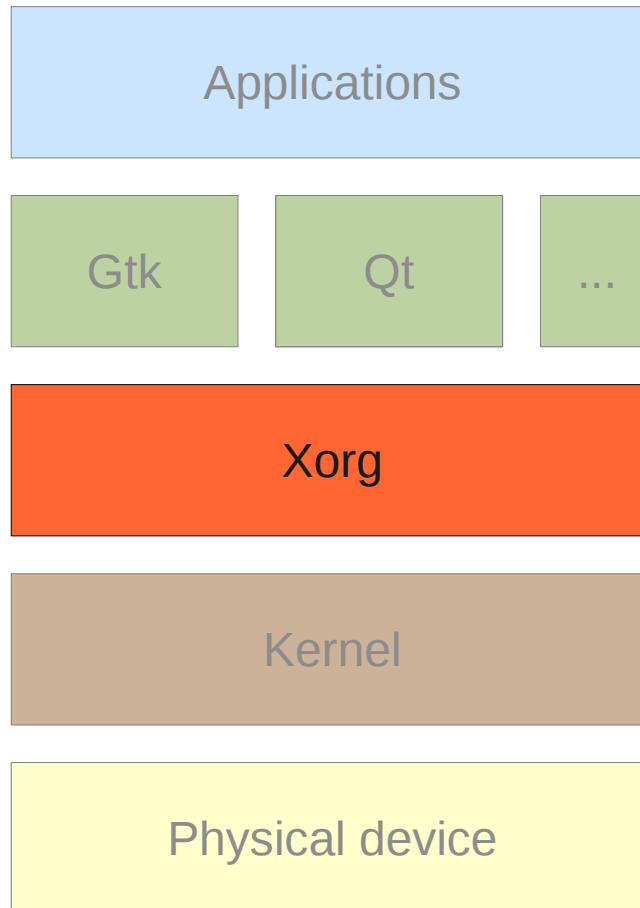
## 2.6.34 (16 May 2010)

- The previous drivers are included in the vanilla kernel!

Just plug and play !\*

\* touchscreen emulation ;-)

# The Linux input « stack »



# Xorg questions

## Multi-touch vs multi-pointer:

### Multi-touch:

- No clicks (the finger is here or not)
- Gestures ?

### Multi-pointer:

- Already integrated in Xorg since 1.7.0 (1 Oct 2009)
- Mouse behavior (clicks...)

# Currently (being pushed)

Nothing mainstream but:

- Same behavior than Windows and MacOS:

To the device is attached the different touches as valuators in the same XEvent

X	Y	R	X0	Y0	ID0	X1	Y1	ID1	X2	Y2	ID2
---	---	---	----	----	-----	----	----	-----	----	----	-----

# Multi-pointers ?

MPX (Multi-Pointer X) since Xorg 1.7.0

- Just have to dispatch the different touches into different virtual devices

Demo

# Tools

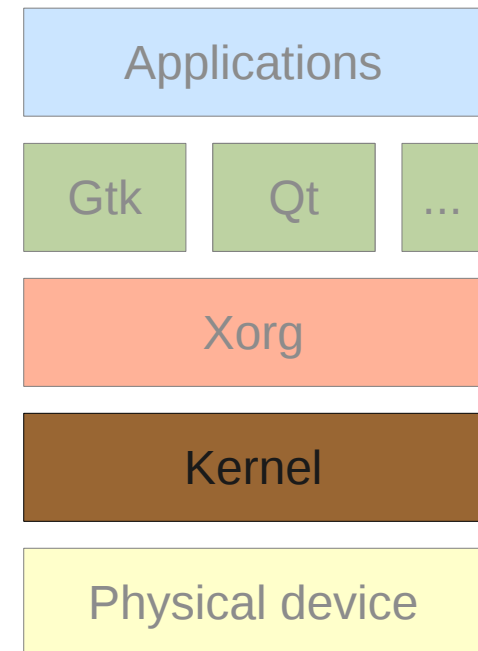
- Xinput:
  - list
  - create-master
  - delete-master
  - reattach
  - float
- Multitouchctl
  - Hook to control the number of sub-devices
- Multitouchd
  - Proof of concept that simulates the clicks to enable mouse emulation

# What's next?

- New kernel protocol

## Introduction of MT\_SLOTS

- Filtering
- First received event is known
- Reduce bandwidth (send only the modifications)

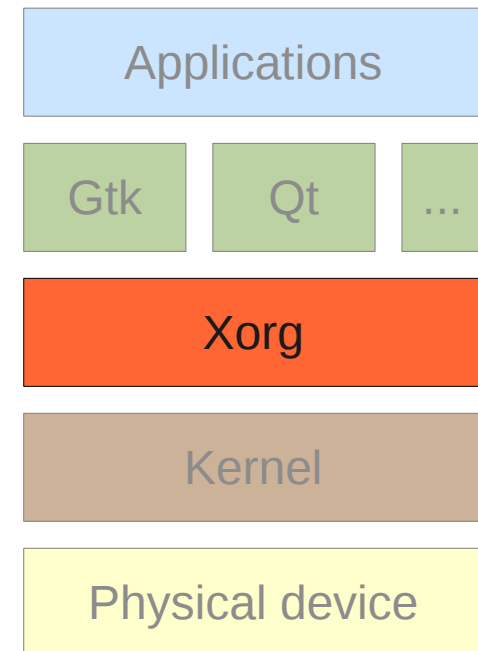


# What's next?

- Xorg

The discussion are in progress

- Short view: how to solve the multiple application problems
- Longer view: refactor the input process in Linux

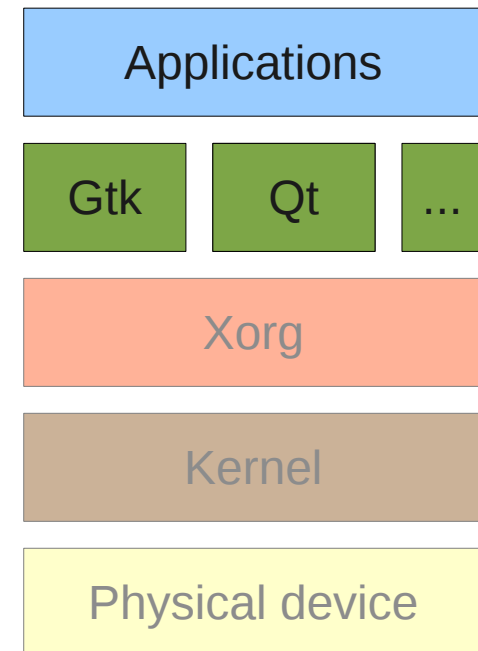




# What's next?

- Qt, GTK, ...
  - Integration of MPX and multi-touch
- Applications
  - Integration of the above work

There is still work to do!



Thank you for your attention

tissoire@cena.fr (Xorg problem)  
stephane.chatty@enac.fr (kernel problem)

<http://lil-enac.fr/en/projects/shareit/linux.html>

<http://lil-enac.fr/en/projects/shareit/xorg-howto.html>