Input
ClutterSeat

- First step towards input handling refactors
- Owner of devices
- Source of events
Input Thread

Input → Events → UI
Input Thread

- Input
- UI / Wayland
- Events
- Virtual devices, warp...

KMS
Input Thread

Input

UI / Wayland

Events

Virtual devices, warp...

Cursor position

KMS
Input Thread

Input

UI / Wayland

KMS

Events

Virtual devices, warp...

Cursor position

Cursor sprite
Potential Benefits

• No missed libinput events
• No blocked pointer cursor
• Better handling of high frequency devices
• Reuse of cursor plane (eg. for tablets)
Touch Mode

• Global toggle for touch-only features
  • Onscreen Keyboard
  • Rotation lock
  • …
Frame Clock
History

- Clutter was originally an application toolkit
  - Each stage draws to a single window
  - A single frame clock driving all the stages
- Worked fine as a X11 compositing window manager
  - Compositing to a single window
  - Not much different from being an X11 application
History

• Enter Wayland and the native backend
  • Quite different from being an application
  • Piece by piece looked less like an application toolkit…
  • … and more like a compositor toolkit
    • Split up stage into per logical monitor “views”
    • Later split up those up even further into per CRTC
• Lots of other changes
Single Clock Head Aches

• Still using a single frame clock causing issues
  • A monitor is driven by a clock on the GPU that updates at a fixed interval (unless VRR)
    • Multiple monitors clocks not necessarily in sync
    • Different monitors cause the clocks to tick at different speed (60 Hz vs 144 Hz)
Bring out the scissor

• Single frame clock standing in the way for progress
• Monitors waiting for each other to update
• Complicated scheduling mechanisms trying to juggle different clocks and capabilities
• Lets split it up!
Enter ClutterFrameClock

- Each monitor already represented by a dedicated view on the stage
- Each view gets its own frame clock
- Each frame clock schedules frame for a single monitor
Multiple Frame Clocks
... but that’s not enough

• Mutter is not only a compositing toolkit, it’s also a compositor GUI toolkit
  • Highly capable animation framework
  • Used extensively by GNOME Shell
  • Assumed a single clock
Making a Connection

- Each animation in some way tied to an actor
- Each actor tied to a set of stage views
- Each stage view has a clock
- Voilà
Multi-clock GNOME Shell

- GNOME Shell almost completely wraps actor animations as “ease” prototype functions and using St.Adjustment

- Making these handle associating an animation with an actor solved the vast majority of multi-clock animations transparently

- Very small changes needed to GNOME Shell JavaScript code, likely the same for most extensions
Layout Machinery
• Introduced shallow relayout mechanism (thanks to Daniel)
• Various bugfixes
• Removed ClutterAllocationFlags, which allowed adding an optimization
• Stricter enforcing of Clutters invariants regarding mapped state
DMA-Buf
Screencast
DMA-Buf Screencast

- Avoids downloading buffers from GPU memory to RAM
- Lighter mainloop after rendering
- Smoother screencasting and screensharing experience
- GNOME Shell’s built-in recorder now using it too
DMA-Buf Screencast
DMA-Buf Screencast

GPU

RAM

Application

(destroyed)
Paint Nodes
Paint Nodes

• Also known as: Clutter 2.0
• 2-step rendering process:
  1. Collect paint nodes
  2. Recursively paint
Paint Nodes

Root

Color

Clip

Transform

Layer

Color

Texture

...
Paint Nodes

• ClutterEffect fully ported
  • Offscreen effects
  • Shell’s unlock screen blur effect

• Next steps:
  • Profiling of subtrees
  • Port GNOME Shell entirely
New Lock Screen
Customizable App Grid
Dialog Redesign
Dialog Redesign

- System dialogs were inconsistent
- Open issue on Gitlab about redoing them
- Design Team did mockups for every dialog (thanks!)
- Landed in GNOME 3.36
Old

New

Enter a Command

Run a Command

Close

Press ESC to close

Power Off

The system will power off automatically in 60 seconds.

Some applications are busy or have unsaved work.

Videos
Playing a movie

Test Editor
There are unsaved documents

Cancel Restart Power Off

Power Off

The system will power off automatically in 60 seconds.

Some applications are busy or have unsaved work

Test Editor
There are unsaved documents

Videos
Playing a movie

Cancel Restart Power Off
Old

Authentication Required
Authentication is needed to run `/usr/bin/ls` as the super user

Password: [redacted]

Cancel Authenticate

New

Authentication Required
Authentication is needed to run `/usr/bin/ls` as the super user

Password: [redacted]

Cancel Authenticate
Workspaces
Workspaces

• Window overlays were positioned statically
• Lead to a few “interesting” bugs with the window titles
• Now positioned using ClutterConstraints (bugs are hopefully gone)
Workspaces

• Window in the overview were also positioned statically
• Quite complicated and old code
• Now positioned using a ClutterLayoutManager
• More separated code, parts of it can be reused elsewhere
Extensions
### Manually Installed

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**Extension Updates Ready**

3 extensions will be updated on next login.
Extensions

• Built-in updates support
• “New” Extensions app
• New CLI tool
• Available in GNOME 3.36
Calendar Drop-down
Calendar Drop-down

• Calendar backend improvements (thanks Milan!)
• Separate Events section
• Refined Weather section
• More to come (Hi Mariana!)
... there's more

• Systemd user session improvements
• Parental Controls support
• Color Picker previews
• ...
We Have a Blog!

• blogs.gnome.org/shell-dev/

• Fresh news directly from those who make it!
  • Monthly development summaries
  • Extension developers can benefit from reading it
  • Read, share, and follow!
Thank You!
State of the Shell

Carlos Garnacho
Florian Müllner
Georges Stavracas
Jonas Ådahl
Jonas Dreßler