







Groundwork, Infrastructure, Standards

The GNOME Shell Magnifier: Adding Built-in Magnification to the GNOME Shell Desktop

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- New window and desktop manager for GNOME 3.
- High Level:
 - Application and window switching.
 - Workspace manager.
 - Find and launch Applications.
- Lower Level:
 - A compositing window manager.
 - 2D effects such as transparency and animation.
 - Leverages "Clutter", scene-based representation of the desktop.



GNOME Shell Technologies

- Clutter
 - Compositing.
- D-Bus
 - Interprocess communication.
- GSettings
 - Preferences storage, retrieval, modifications, and immediate response to preference changes.
- A lot of available "power".
- How to leverage?
- One way: magnification and screen enhancement.



Approaches to Screen Enhancement

- Pixel-based vs. Compositor-based Magnification.
- Pixel-based:
 - Grab a region of pixels.
 - Transform them in some way (e.g., magnify).
 - No concept of "objects" just a region of dots.





• Pixel-based magnification.

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Approaches to Screen Enhancement

- Compositor-based:
- Abstract description at a higher level than raw pixels.
- "Objects"
 - Sprites, textures, layers, groups of objects.
 - Object properties (e.g., colour, transparency).





Approaches to Screen Enhancement

Compositor-based magnification.

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GNOME Shell: Clutter

- Clutter/mutter compositing window manager.
- Stage metaphor.
- Desktop is the stage.
- Windows, buttons, menus, icons are "actors".
- Actors can be atomic contain no other actors.
- Actors can be group, or containers of other actors.
 - Groups can contain atomic or other group actors.



• Stage:





Task Switcher:





• Stage:





GNOME Shell Stage (with magnifier)

• Stage:



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GNOME Shell Magnifier

- Can leverage compositing capabilities of Clutter to enhance the screen.
- Magnifier is itself an actor.
- Magnification is not an add-on but an intrinsic function of the desktop.



GNOME Shell: D-Bus

- Interprocess communication
 - One process can call another.
 - Another application can invoke the magnifier.
- Onscreen keyboard (GOK)
 - E.g., as focus is placed on a key that represents a menu item, show an enhanced version of that menu item.
 - Provides better context.
- Orca Screen Reader
 - As user navigates UI, Orca asks for a magnified view of what has focus.



GNOME Shell: User Preferences

- Configuration Management
 - Load and store preferences.
 - Modify preferences.
 - *Respond to changes in preferences as they happen.
- Currently
 - Mouse tracking.
 - Screen position.
 - Magnification factor.
 - Cross hairs.
 - "Lens Mode".



- Mouse Tracking
 - Centred.
 - Proportional.
 - Push.
 - None.



- Screen Position
 - Full.
 - Top Half of Screen.
 - Left Half.
 - Right Half.
 - Bottom Half.
 - Arbitrary or User defined.



User Preferences: Magnification Factor

- Magnification Factor
 - UI constrained from 1x through 10x .
 - Technically, less than 1 through very large
 - could act as a minifier.



- Cross hairs
 - Colour.
 - Opacity
 - Completely transparent through opaque.
 - Thickness.
 - Length.
 - Clip near centre
 - If cross hairs interfere with mouse image.



- Lens mode
 - The magnified view follows the mouse.
 - Like a movable magnifying glass.
 - Interacts with mouse tracking modes.



User Preferences

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		beginning. We define inclusive design as design that enables and supports the participation of human diversity. We see disability as a mismatch between the needs of the individual and provided and accessibility as the adaptability of the system to the needs of each individual. Or are all grounded in this principle.	f in the Dur Dur Scroll at screen edges	Length: 1570 Thickness: 20 v	
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- Colour inversion.
- Brightness levels.
- Contrast.
- Multiple Screens.
- Quick access for magnification
 - Keystrokes to increase/decrease magnification.
 - Mouse scroll wheel.
- Enhance accessible objects
 - e.g., Toolbar.



- Magnification built into next GNOME desktop.
- Supports typical screen magnification/enhancement features.
- Compositor-based leads to other ways to enhance the desktop.



The GNOME Shell Magnifier

- GNOME Shell:
 - http://live.gnome.org/GnomeShell
- GNOME Shell Magnifier:
 - http://live.gnome.org/GnomeShell/Magnification