Open Accessibility Everywhere

Groundwork, Infrastructure, Standards

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

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GNOME Shell

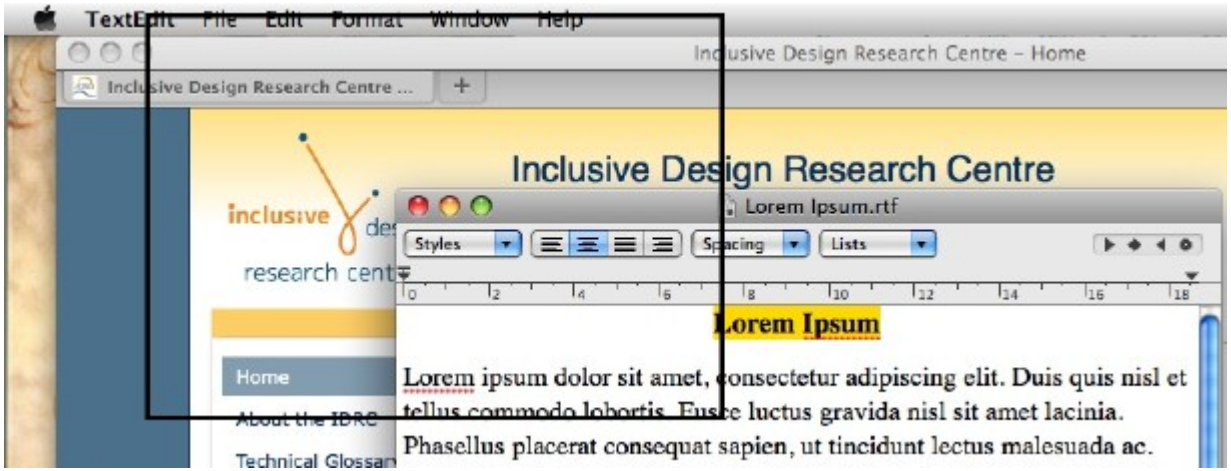
- **New window and desktop manager for GNOME 3.**
- **High Level:**
  - **Application and window switching.**
  - **Workspace manager.**
  - **Find and launch Applications.**
- **Lower Level:**
  - **A compositing window manager.**
  - **2D effects such as transparency and animation.**
  - **Leverages "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.**

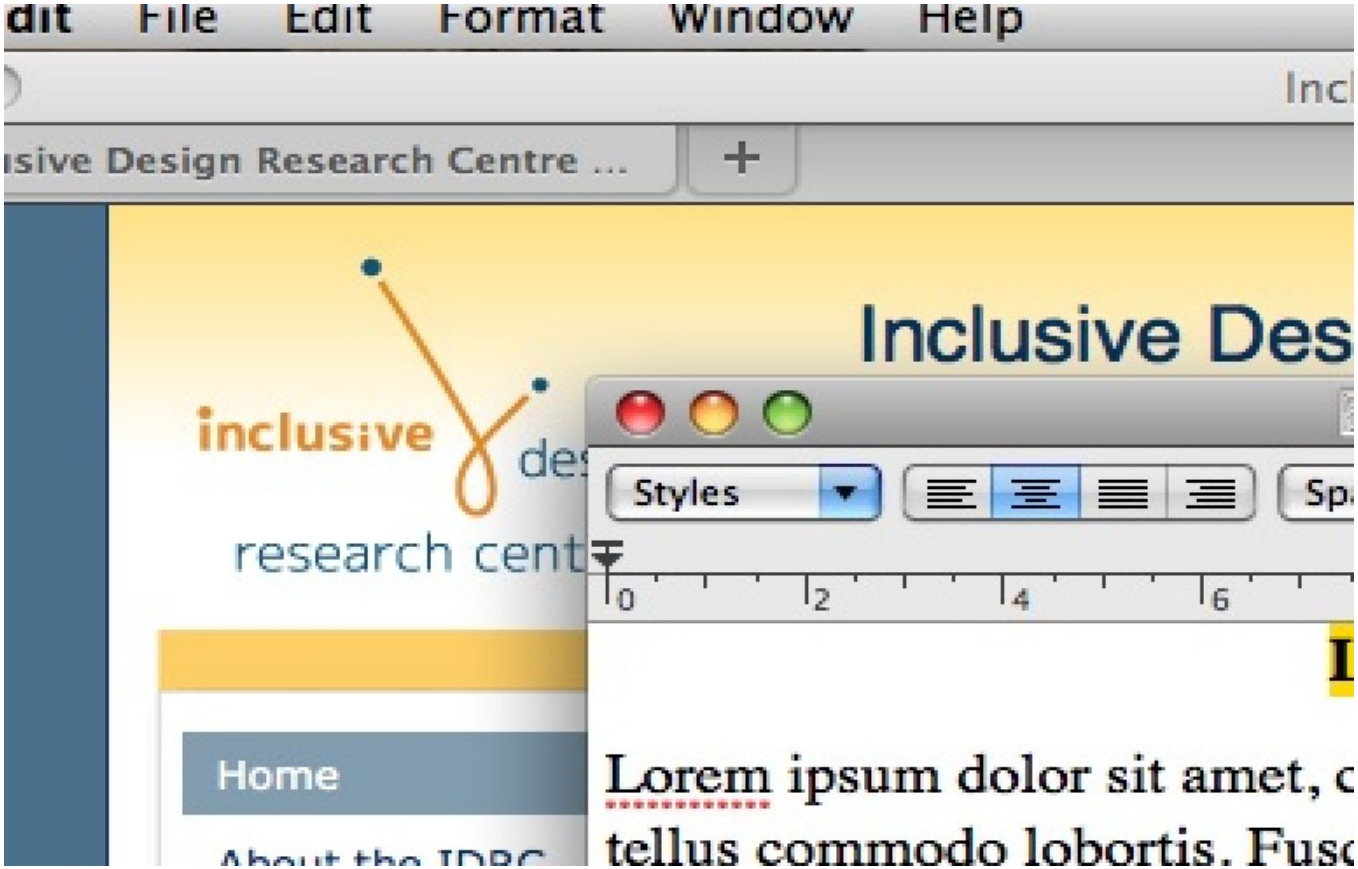
Approaches to Screen Enhancement

- **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.**



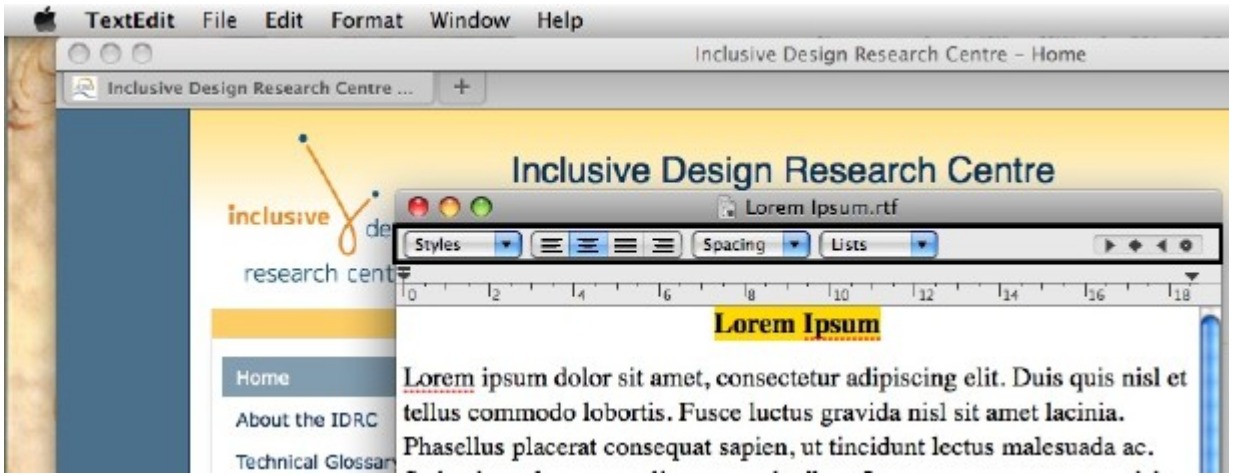
Approaches to Screen Enhancement

- **Pixel-based magnification.**



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

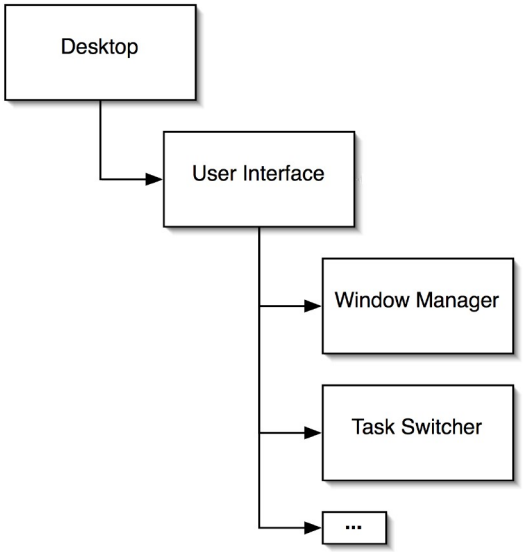
- **Compositor-based magnification.**

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.**

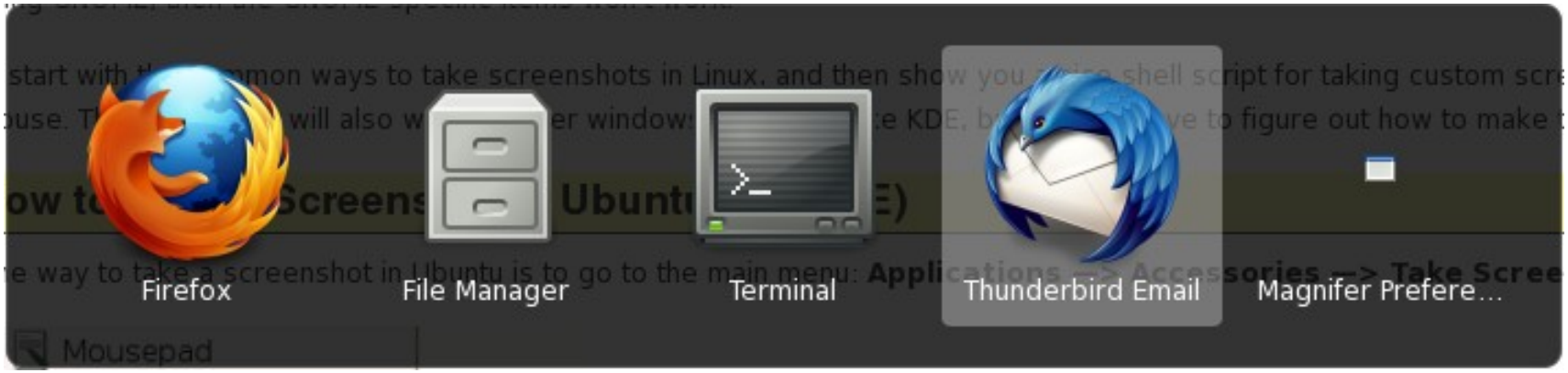
GNOME Shell Stage (basic)

- **Stage:**



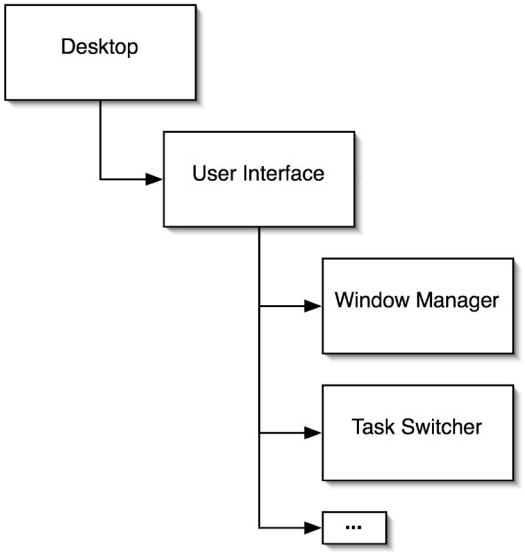
GNOME Shell Stage

- **Task Switcher:**



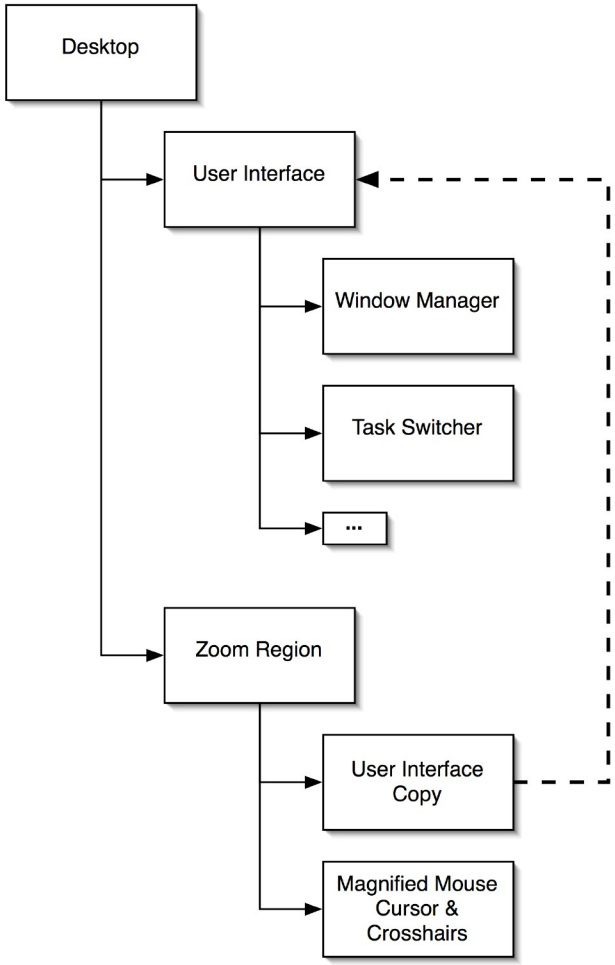
GNOME Shell Stage (basic)

- **Stage:**



GNOME Shell Stage (with magnifier)

- **Stage:**



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".**

User Preferences: Mouse

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

User Preferences: Screen Position

- **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.**

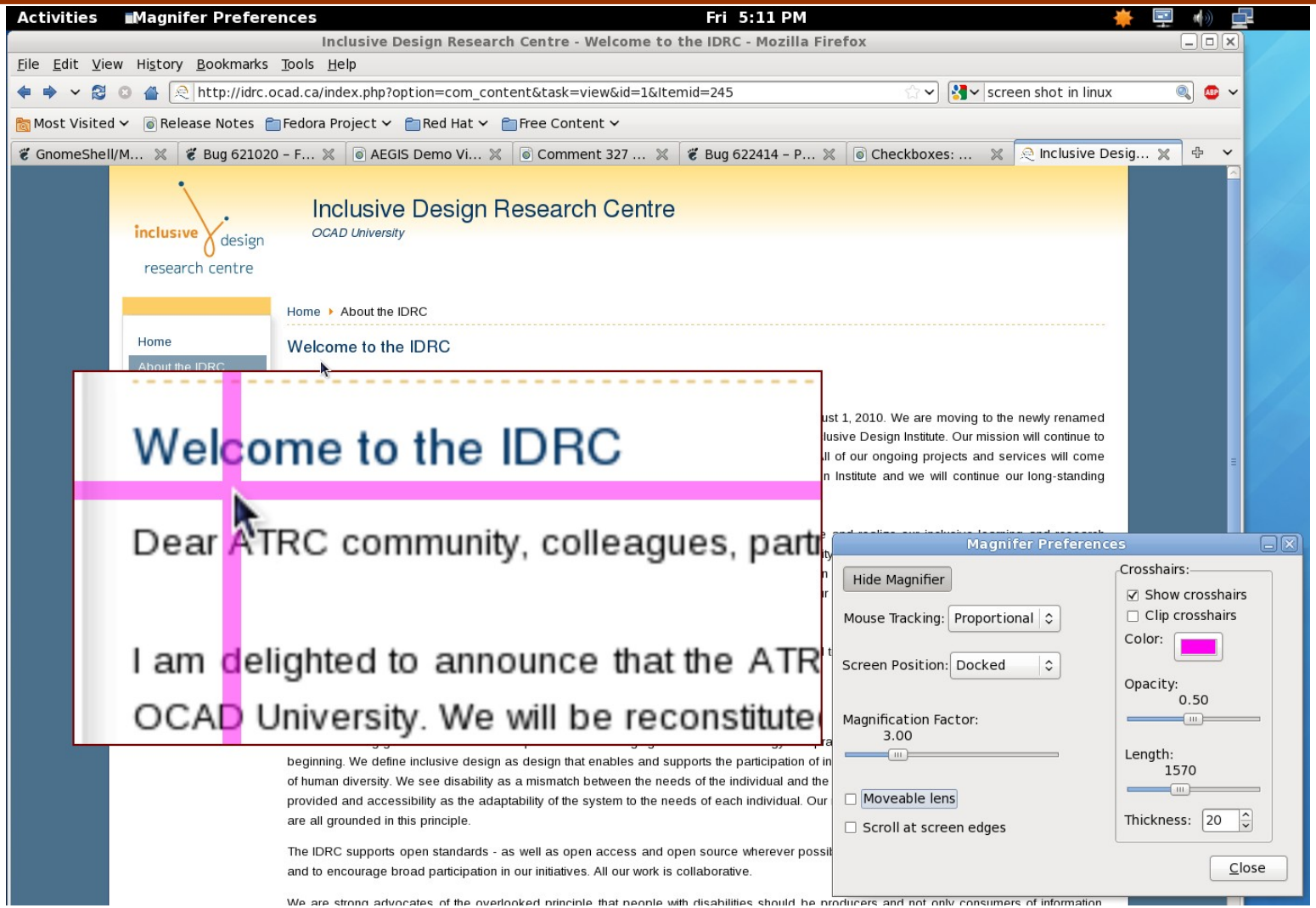
User Preferences: Cross hairs

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

User Preferences: Lens

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

User Preferences



Future Work

- **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.**

Conclusions

- **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**