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Free Software Engineering

Debugging Accessibility Issues

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Orca 101

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Screen Readers Present Screen Contents

- To users who are blind or visually impaired
- In synthesized speech and/or refreshable braille
- As they navigate using the application's commands:
  - Focus changes
  - Caret movement
  - Selection changes
- And when “events of interest” occur in non-focused widgets
  - Notifications
  - Incoming chat messages

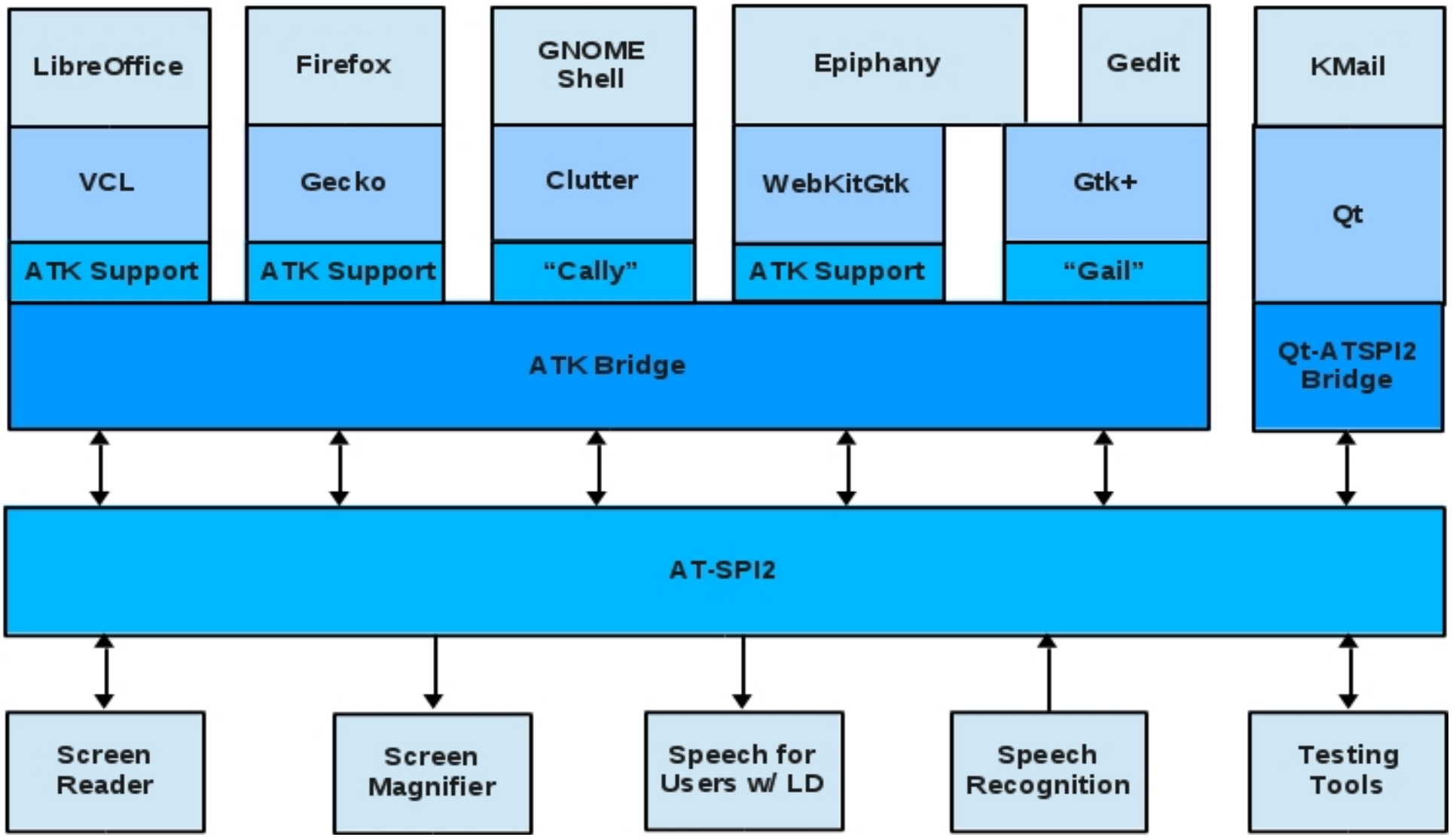
Screen Readers Provide Additional Commands For More Efficient Access

- Review chat messages and notifications
- Navigate by element type
- Obtain a summary of font/formatting information
- Search the screen for an object
- Etc.

Orca: A Screen Reader for the Free Desktop

- Written in Python
- Access to graphical desktop environments
- Presentation:
  - Of objects, events, and other functionality via AT-SPI2
  - Speech synthesis via speech-dispatcher
  - Braille translation via liblouis
  - Braille display via brlapi

Where Is the Orca Bug?


LibreOffice
Firefox
GNOME Shell
Epiphany
Gedit
KMail
VCL
Gecko
Clutter
WebKitGtk
Gtk+
Qt
ATK Support
ATK Support
"Cally"
ATK Support
"Gail"
ATK Bridge
Qt-ATSPI2 Bridge
AT-SPI2
Screen Reader
Screen Magnifier
Speech for Users w/ LD
Speech Recognition
Testing Tools

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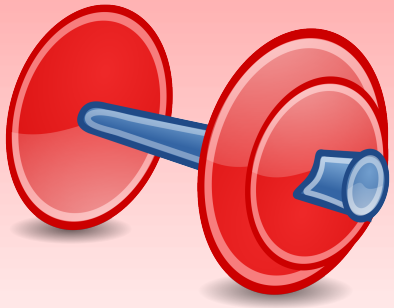
Accerciser 101



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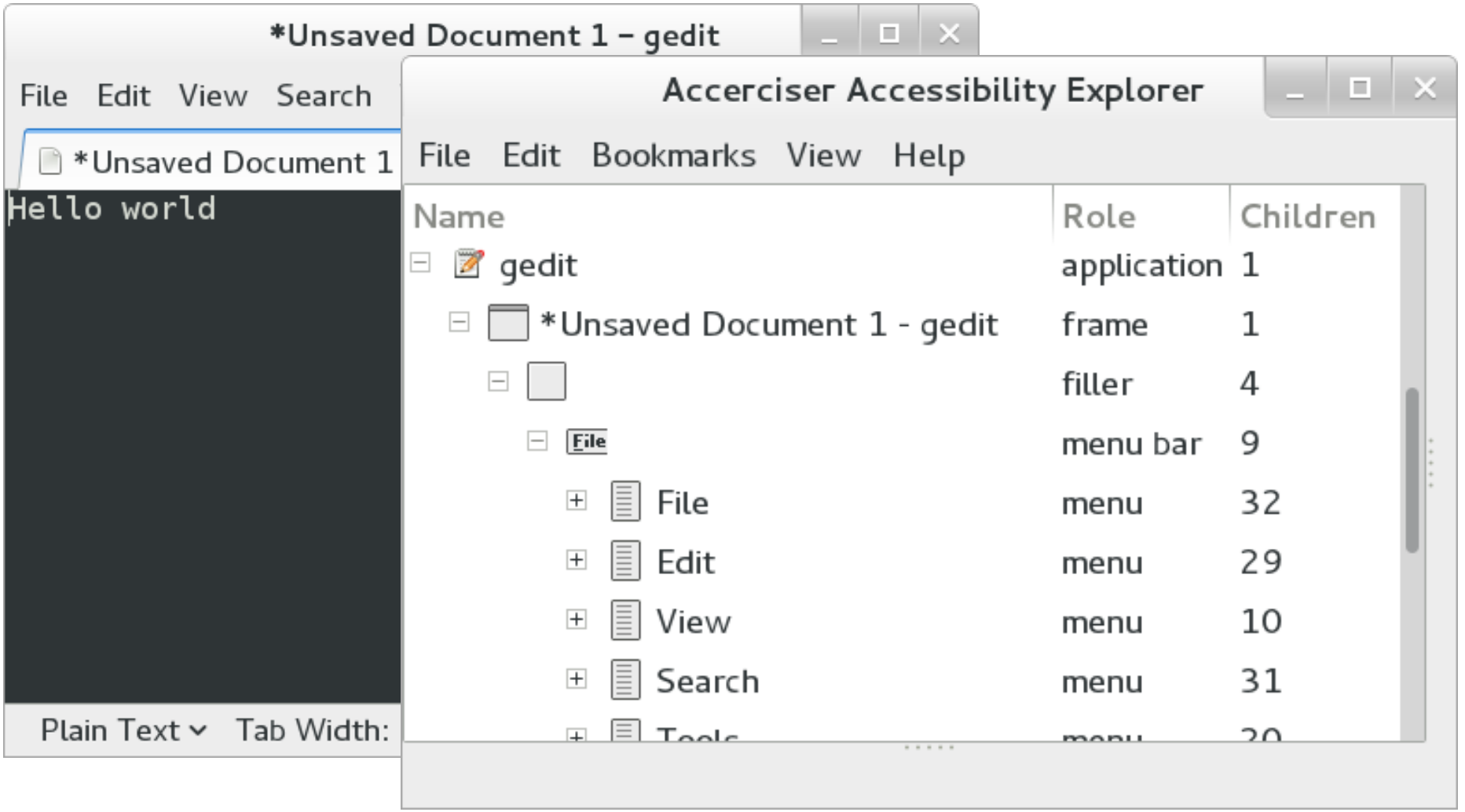
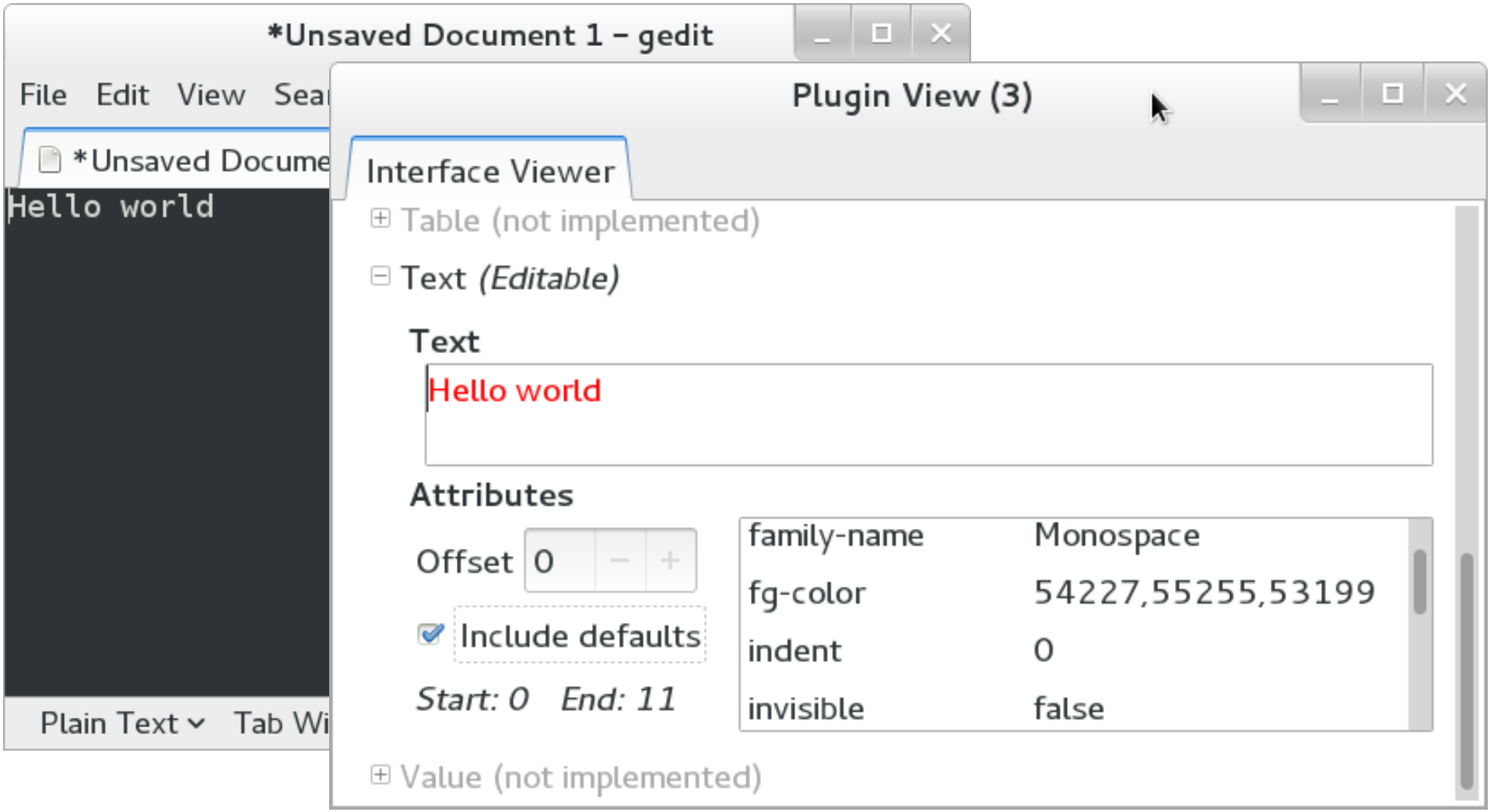
Accerciser: The Interactive “Accessibility Explorer”

- Written in Python
- View accessible objects
- Examine implemented accessibility interfaces
- Monitor accessibility events
- Interact with accessible objects through their interfaces

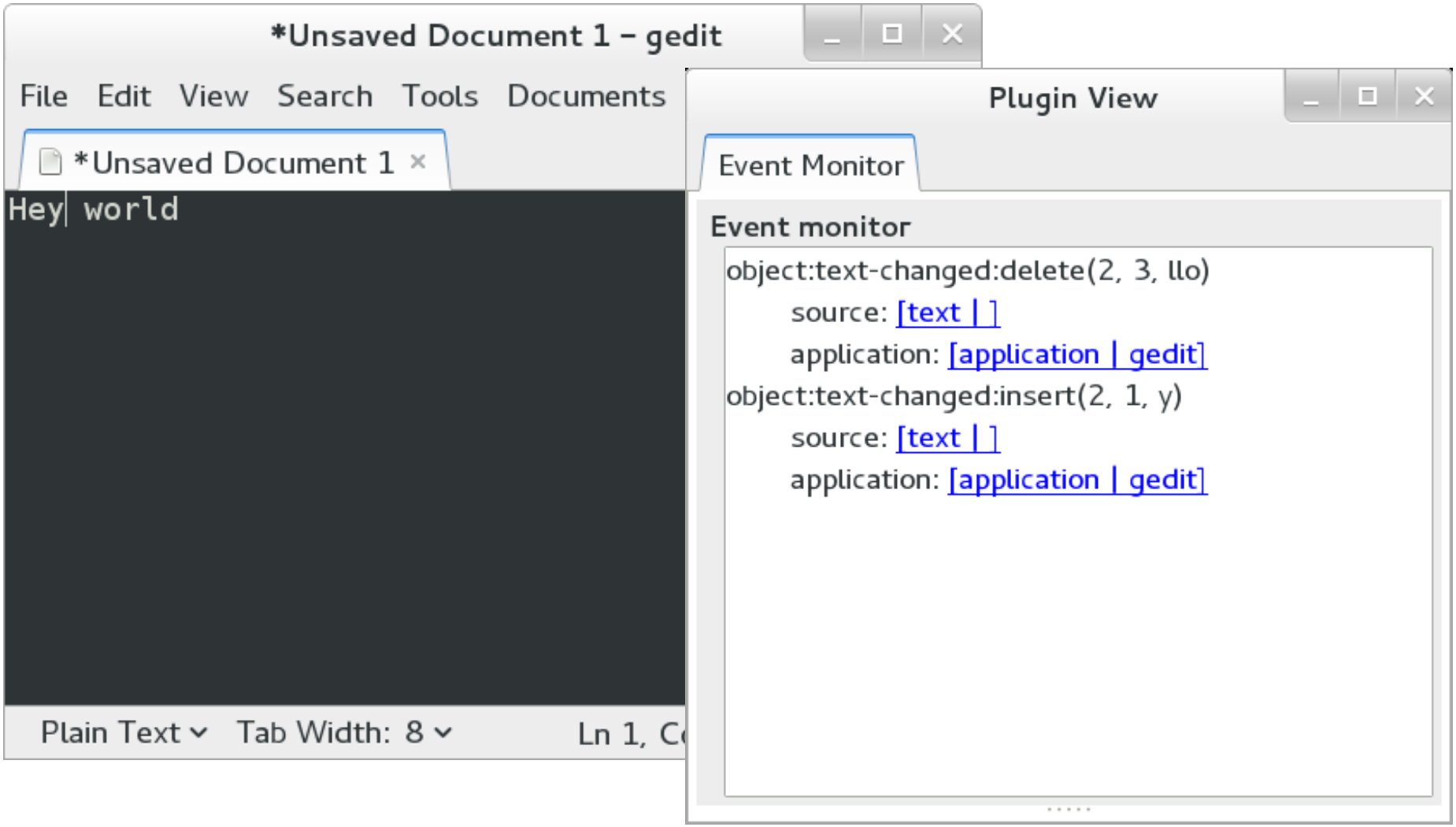
Accerciser: View Accessible Objects



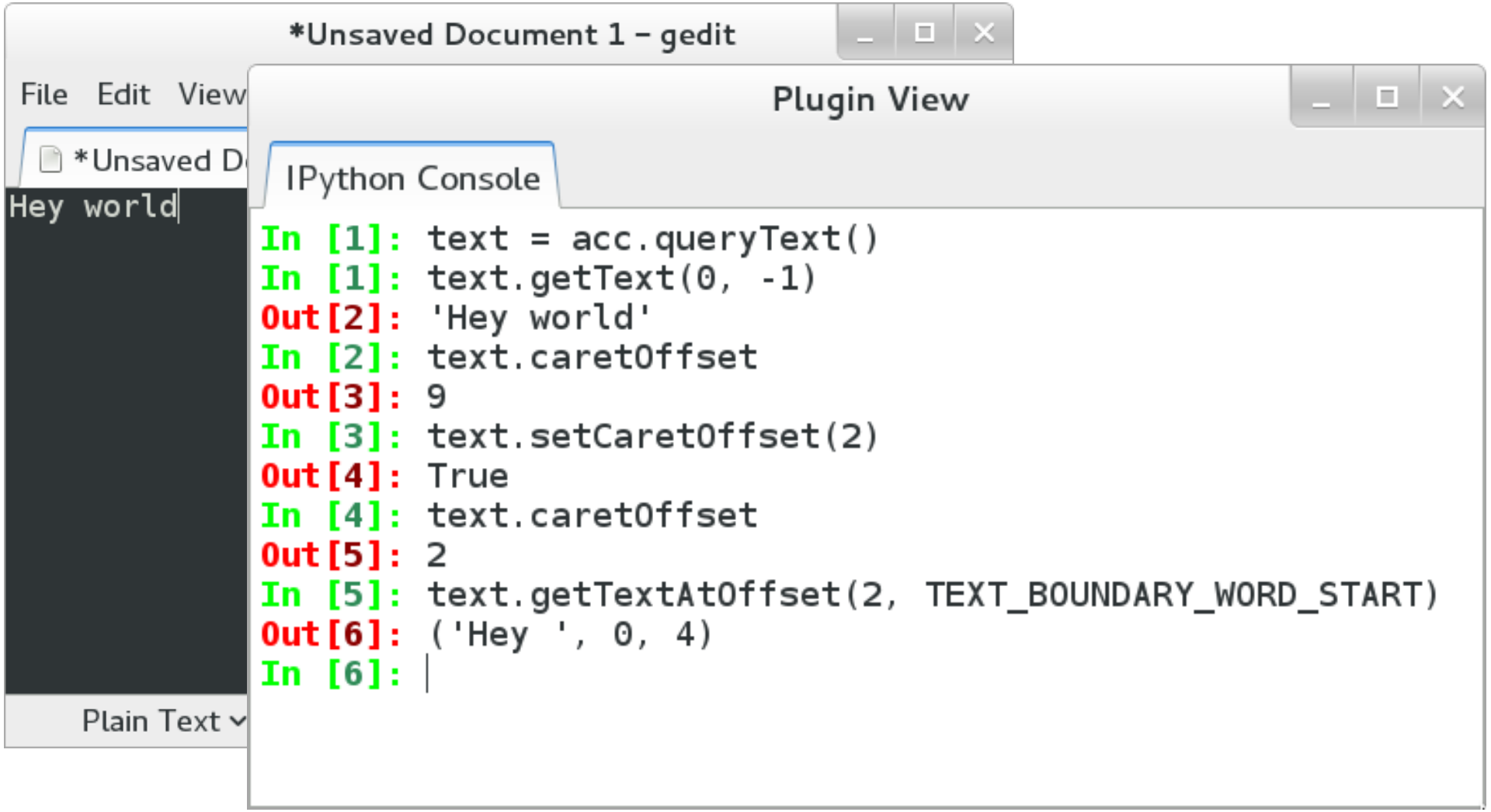
Accerciser: Examine Implemented Interfaces



Accerciser: Monitor Accessibility Events



Accerciser: Interact with Accessible Objects



Is the bug in the application or toolkit?

- Do you see the objects to be presented by Orca in Accerciser?
- Do the objects emit accessible events when you navigate?
- Do the objects have the needed accessible properties?
- Do the objects implement the needed accessible interfaces?

If you CANNOT answer “yes” to all of the above, the bug is likely in the application or toolkit

Rolling Your Own Listener

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Rolling Your Own Listener

- Pick the event type of interest
- Define the handler's behavior
- Register the listener
- Start the registry

Hello World Listener

helloworld.py – emacs@blockhead

File Edit Options Buffers Tools Python Help

```
#!/usr/bin/python
import pyatspi

def listener(e):
    print e

pyatspi.Registry.registerEventListener(listener, "object:state-changed")
pyatspi.Registry.start()
```

-:--- **helloworld.py**   All (9,0)   (Python)

Hello World Listener 2

helloworld2.py – emacs@blockhead

File Edit Options Buffers Tools Python Help

```
#!/usr/bin/python
import pyatspi

def listener(e):
    obj = e.source
    app = obj.getApplication()
    if app.name != 'gedit' or obj.getRole() != pyatspi.ROLE_MENU_ITEM:
        return

    print e

pyatspi.Registry.registerEventListener(
    listener, "object:state-changed:focused", "object:state-changed:selected")
pyatspi.Registry.start()
```

-:--- **helloworld2.py**   All (15,0)   (Python)

Hello World Listener 2 Results

```
object:state-changed:selected(1, 0, 0)
        source: [menu item | New]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | New]
        host_application: [application | gedit]
object:state-changed:selected(1, 0, 0)
        source: [menu item | Open...]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | Open...]
        host_application: [application | gedit]
object:state-changed:selected(1, 0, 0)
        source: [menu item | Save]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | Save]
        host_application: [application | gedit]
```

Hello World Listener 2 Translation

```
object:state-changed:selected(1, 0, 0)
        source: [menu item | New]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | New]
        host_application: [application | gedit]
object:state-changed:selected(1, 0, 0)
        source: [menu item | Open...]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | Open...]
        host_application: [application | gedit]
object:state-changed:selected(1, 0, 0)
        source: [menu item | Save]
        host_application: [application | gedit]
object:state-changed:selected(0, 0, 0)
        source: [menu item | Save]
        host_application: [application | gedit]
```

To present the selected menu item as a user navigates:

- Listen for:
  - object:state-changed:selected
  - event.detail1 ==1
- Speak and braille:
  - event.source.name

TODO:

Investigate why we are not getting the expected focused events.