PHP-GTK 2

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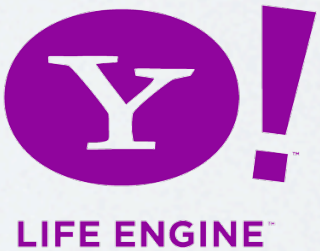


Agenda

What is PHP-GTK?

Gtk+ 2 Changes

PHP-GTK 2 Changes

Code Examples

Future Work

PHP-GTK

An extension interfacing with GTK+ library

Allows development of client-side GUI applications

Works on multiple platforms (Unix, Win32, Mac)

Very large extension

- 211 classes
- 2872 methods

PHP-GTK

First release in 2001

Since then many small and large applications have appeared

It even has a job market now!

PHP-GTK

Main concepts

- Widgets - user interface elements
- Signals / callbacks - event system

PHP-GTK

PHP-GTK 1 was hindered by PHP 4's object model

- No proper object destruction
- Crippled object overloading
- And slow object implementation in general

Partially provided motivation for new object model in PHP 5

PHP-GTK 2

Based on PHP 5.1 and GTK+ 2.6

All the latest bells and whistles

Sets the baseline for future development

Both should be well entrenched by the time of first release of PHP-GTK 2 (imminent)

PHP-GTK 2

Almost a complete rewrite

Mostly backwards compatible

Compatibility broken when necessary

Documentation being rewritten as well

PHP 5

Flexible and powerful object model

Finally has destructors!

Supports modern concepts such as exceptions, interfaces, overloading, etc

Has many hooks for extensibility

PHP-GTK 2 Changes

Backwards compatibility is mostly preserved.

But some incompatible changes had to be introduced.

- internal extension name is ‘php-gtk’ instead of ‘gtk’
- shared library is called php_gtk2.so (dll)
- global constants are no more

PHP-GTK 2 Changes

Loading PHP-GTK with `dl()` is possible, but problems may result in some edge cases.

Loading via INI mechanism is preferable.

```
extension = php_gtk2.so
```

Use of Exceptions

PHP 5 supports exceptions, which we can take advantage of. The question is, what sort of conditions should generate an exception.

At the current point of development, exceptions are thrown:

- in object constructors on any sort of error
- in methods that use GError mechanism, such as `GdkPixbuf::new_from_file()`
- in codepage ⇔ UTF-8 conversions

Use of Exceptions

Constructor Exceptions

```
try {
    $store = new GtkListStore(GdkPixbuf::gtype, Gtk::TYPE_PHP_OBJECT);
} catch (PhpGtkConstructException $e) {
    echo $e->message();
}
```

GError Exceptions

```
try {
    $chooser = new GtkFileChooserWidget();
    $chooser->add_shortcut_folder($folder);
} catch (PhpGtkGErrorException $e) {
    die($e->message . "\n");
}
```

Constants

Globals constants are no more. This is one of those incompatible changes.

Instead, all enumerations, flags, and other constants are partitioned by top-level module class: Gtk, Gdk, Pango, Atk and the extension ones.

```
GTK_STATE_PRELIGHT → Gtk::STATE_PRELIGHT
GDK_2BUTTON_PRESS → Gdk::2BUTTON_PRESS
```

Connecting to Signals

PHP-GTK 1 had two connection methods():

- `connect()`
- `connect_object()`

The latter one was semantically confusing and is deprecated in favor of a simpler one.

Connecting to Signals

`connect()` - connect normally, passing signal widget and signal-specific parameters to callback

```
function on_deleted($entry, $start, $end, $my_data)
{ ... }

$entry = new GtkEntry();
$entry->connect('delete-text', 'on_deleted', true);
```

Connecting to Signals

`connect_simple()` - do not pass signal object or signal parameters

```
function quit()
{
    gtk::main_quit();
}

$window = new GtkWindow();
$window->connect_simple('destroy', 'quit');
$button = new GtkButton('Quit');
$window->add($button);

// connect to built-in method
$button->connect_simple('clicked', array($window, 'destroy'));
```

PHP-GTK Fixes

In PHP-GTK 1, due to problems with the underlying object system, allocated memory could not be properly released at the end of object's lifetime. Long-running scripts could consume a lot of memory.

Now PHP's object store is much more flexible and all these problems have been eradicated. Objects are destroyed as soon as they stop being used.

```
while (1) {
    $pixbuf = GdkPixbuf::new_from_file($file);
}
```

PHP-GTK Fixes

PHP-GTK 1 required assigning objects instantiated with the `new` operator by reference, except for a few cases:

- using new in function parameters
- assigning to globals from inside functions
- assigning to object properties

Very confusing and prone to errors.

With PHP-GTK 2 you can use regular assignment.

PHP-GTK Fixes

In PHP-GTK 1, this example would result in error.

```
$text = $button->child->get_text();
```

You had to do some code gymnastics.

```
$child = $button->child;
$text = $child->get_text();
```

Has been fixed in PHP 5. Even this works:

```
$text = $button->get_child()->get_text();
```

Gtk+2

New flexible and powerful type system

Good introspection and extensibility

Can be easily mapped onto PHP object model

Unicode

All user text data is handled in UTF-8

Expects input to be the same

PHP-GTK handles conversion of input and output strings based on a global codepage setting

Once PHP 6 is out, native Unicode support will take over

Pango

An open-source framework for layout and rendering of i18n text

Has SGML-like markup language for modifying text attributes (font, size, etc)

Uses Unicode and platform-specific font systems

Gdk 2

Based on the new object system

Classes can have signals, properties, etc

Has double-buffering for smoooth rendering

Much better Win32 support

GdkPixbuf

Merged into GDK, not a separate library anymore

Supports image saving, as well as loading

ATK

A toolkit for adding accessibility to applications

Allows accessibility tools to navigate UI

Complete keyboard navigation for Gtk+

Nearly all key bindings are now customizable

Gtk 2

Many cool new widgets

Many deprecated widgets

API has been cleaned up

Deprecated Widgets

PHP-GTK 2 will issue a warning if you try to use a deprecated issue or method.

In most cases you will be referred to the new widget or method.

GtkList

GtkTree

GtkCList

GtkPixmap

GtkItemFactory

GtkOptionMenu

GtkProgress

GtkPreview

GtkCTree

GtkText

Gtk 2

New stock item system

Has themeable stock icons

Application controls can have consistent and visually pleasing look

Possible to register custom stock icons that can be themed

Model-View Architecture

Provides foundation for data-driven widgets

Model is an abstract interface

Two models provided: list and tree store

Possible to write custom models

List/Tree Widgets

Editable cells

Each cell is drawn by a cell renderer

Included renderers can draw text, image, checkbox, progress bar, and combo box

Possible to write custom cell renderers

List/Tree Widgets

Flexible sorting with custom sort functions

On-the-fly model filtering: hide/display rows based on some condition, restructure existing model, etc

Built-in drag-n-drop

Text Widget

Uses model-view architecture

Full i18n support based on Pango engine

Display and editing of bidi and complex text

Text Widget

Mark objects allow “bookmarking” positions in the text

Text can have many complex attributes applied to it with tag objects: color, size, spacing

Also behavioral features such as editability

Text Widget

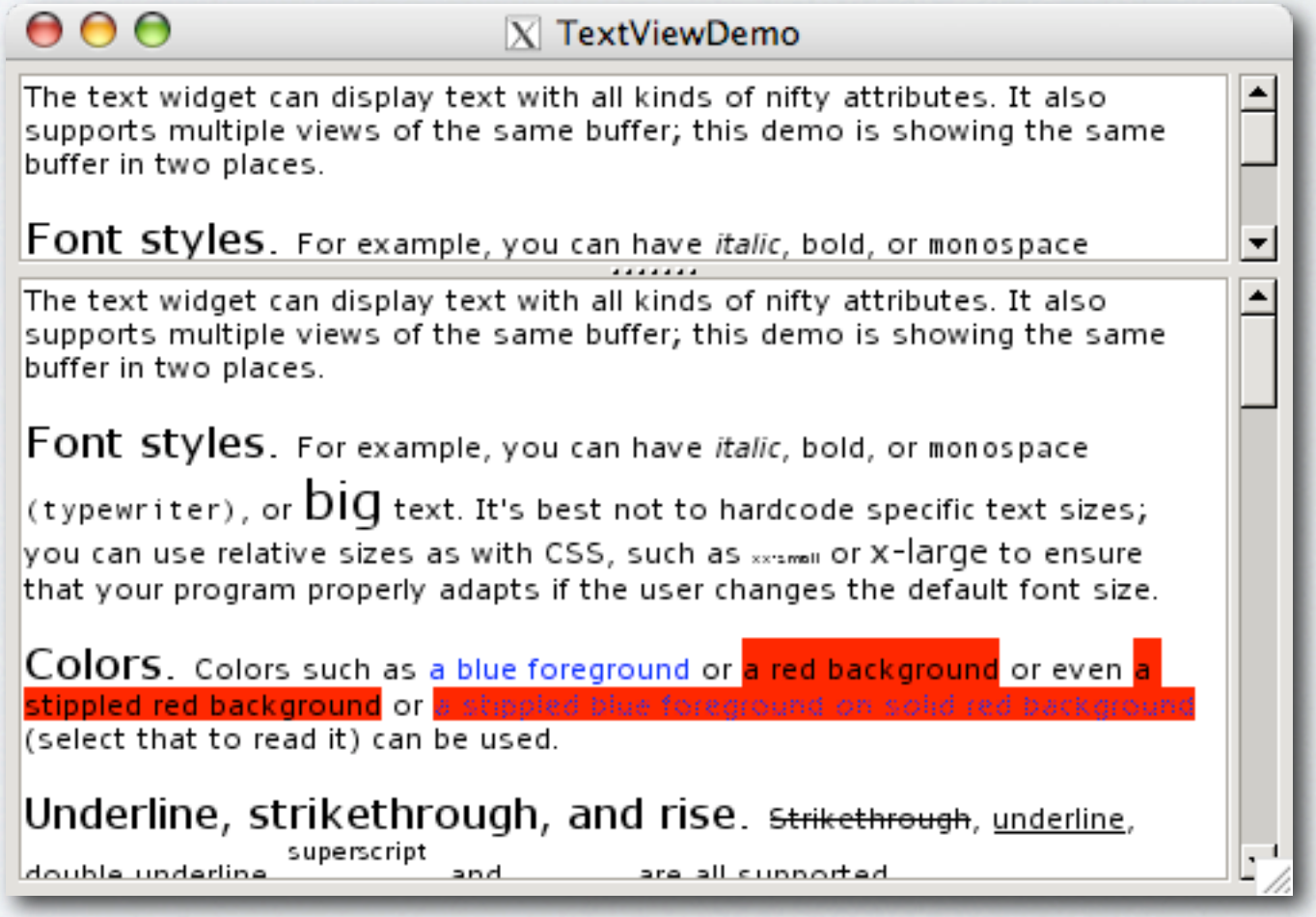
Selection drag-n-drop

Optional “side windows” allow display of additional information such as breakpoints, line numbers, etc

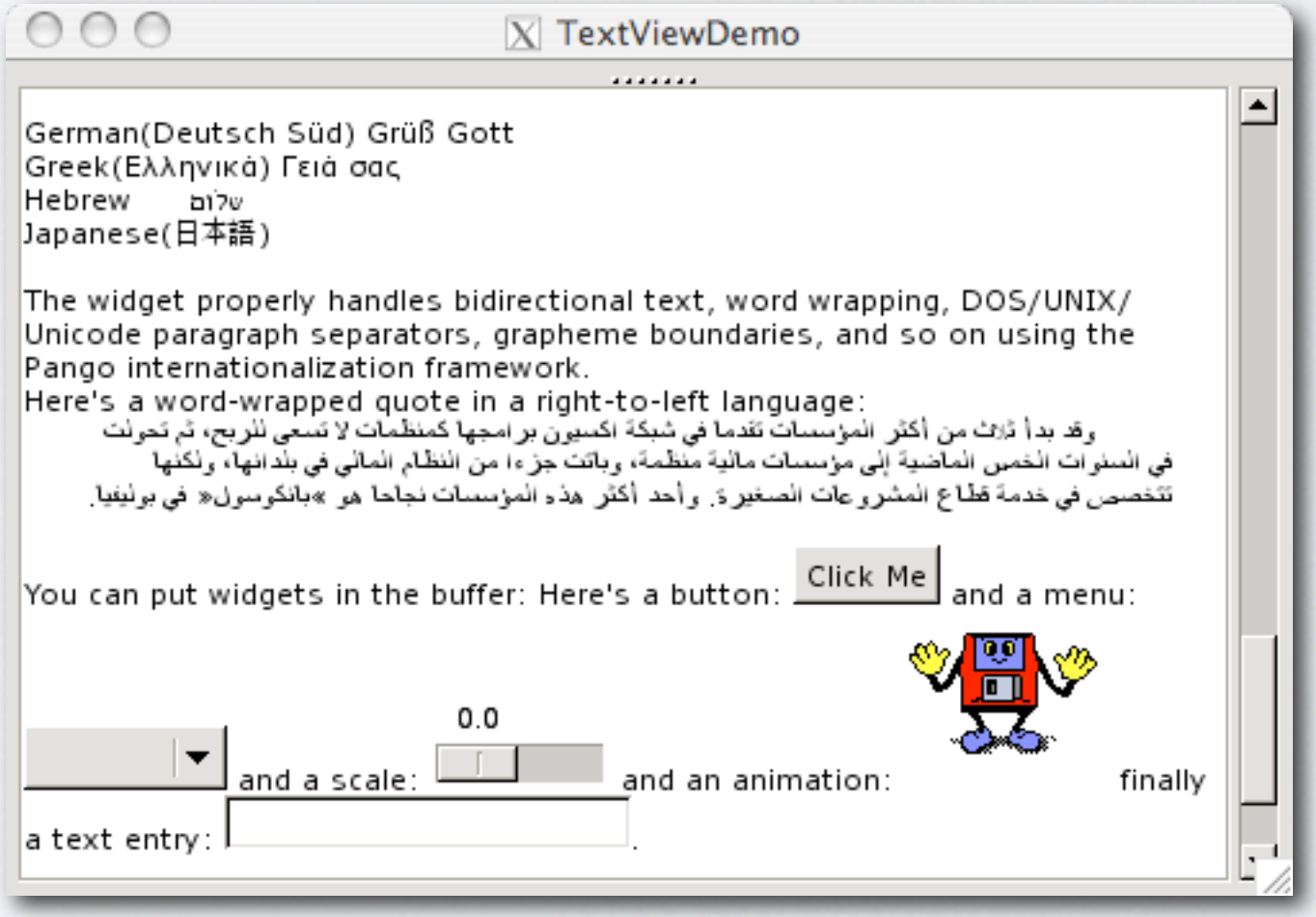
Hooks for implementing undo

New Widget Gallery

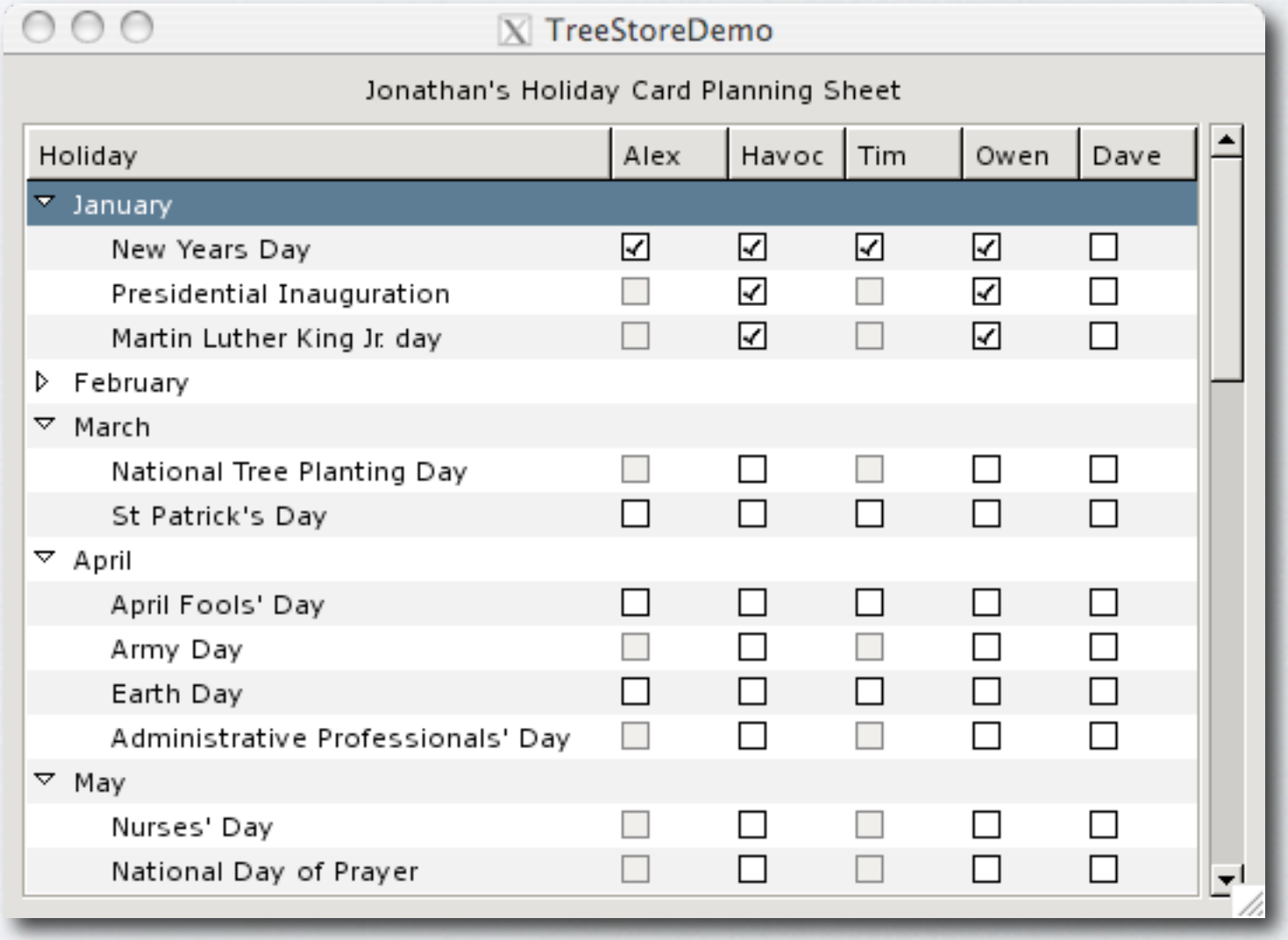
GtkTextView



GtkTextView



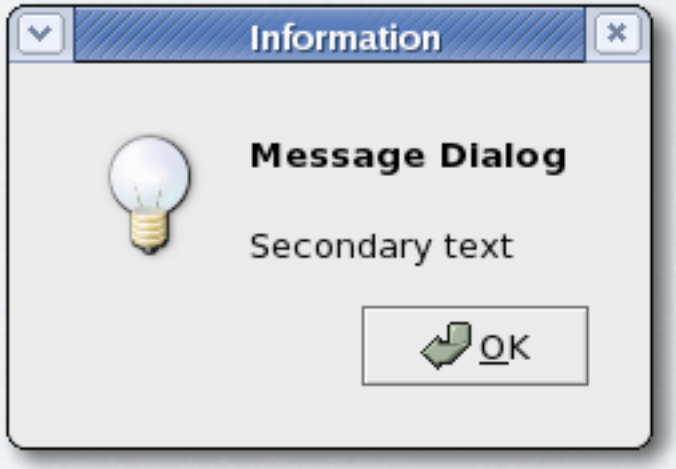
GtkTreeView



GtkMessageDialog

A convenience widget, displaying a message along with an informational icon.

Provides an easy way to display a message and get back user's response.



GtkAboutDialog

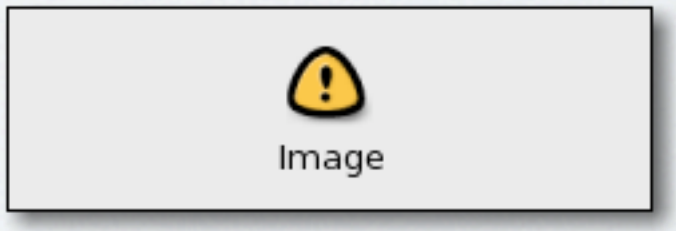
Offers a simple way to display information about a program.

Allows for display of license and program credits.

GtkImage

A widget for easy display of various pictorial information.

Can display pixbufs, pixmaps, icons, stock items, animations.



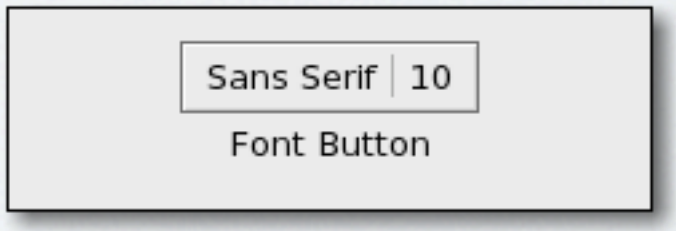
GtkClipboard

Not a widget, but an object simplifying access to system clipboard.

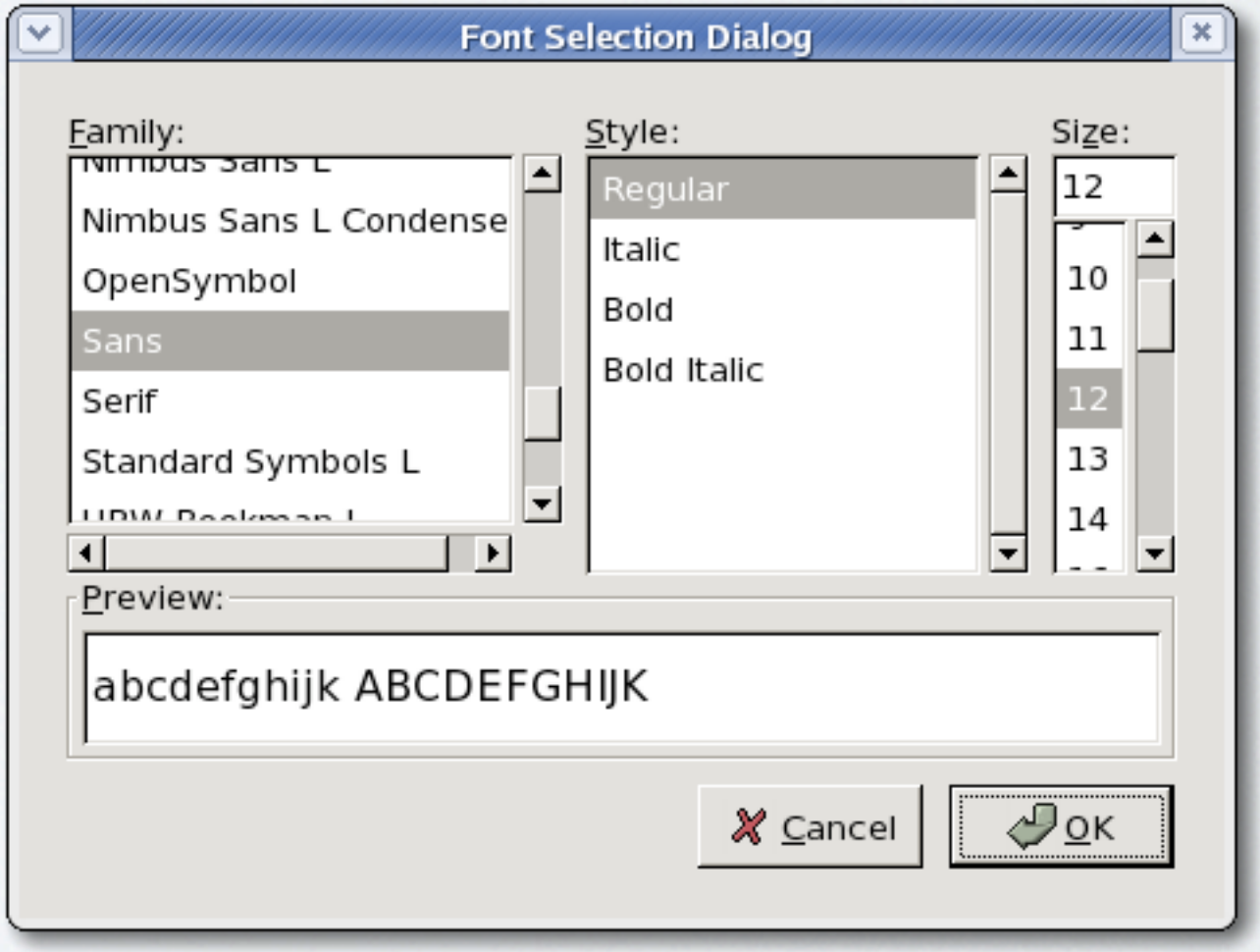
Custom cut, copy, & paste actions are no longer out of reach.

GtkFontButton

Displays the currently selected font and allows to open a font selection dialog to change the font.



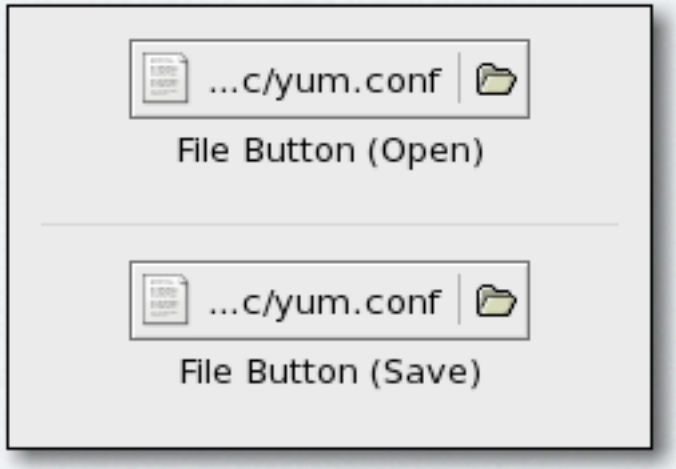
GtkFontSelectionDialog



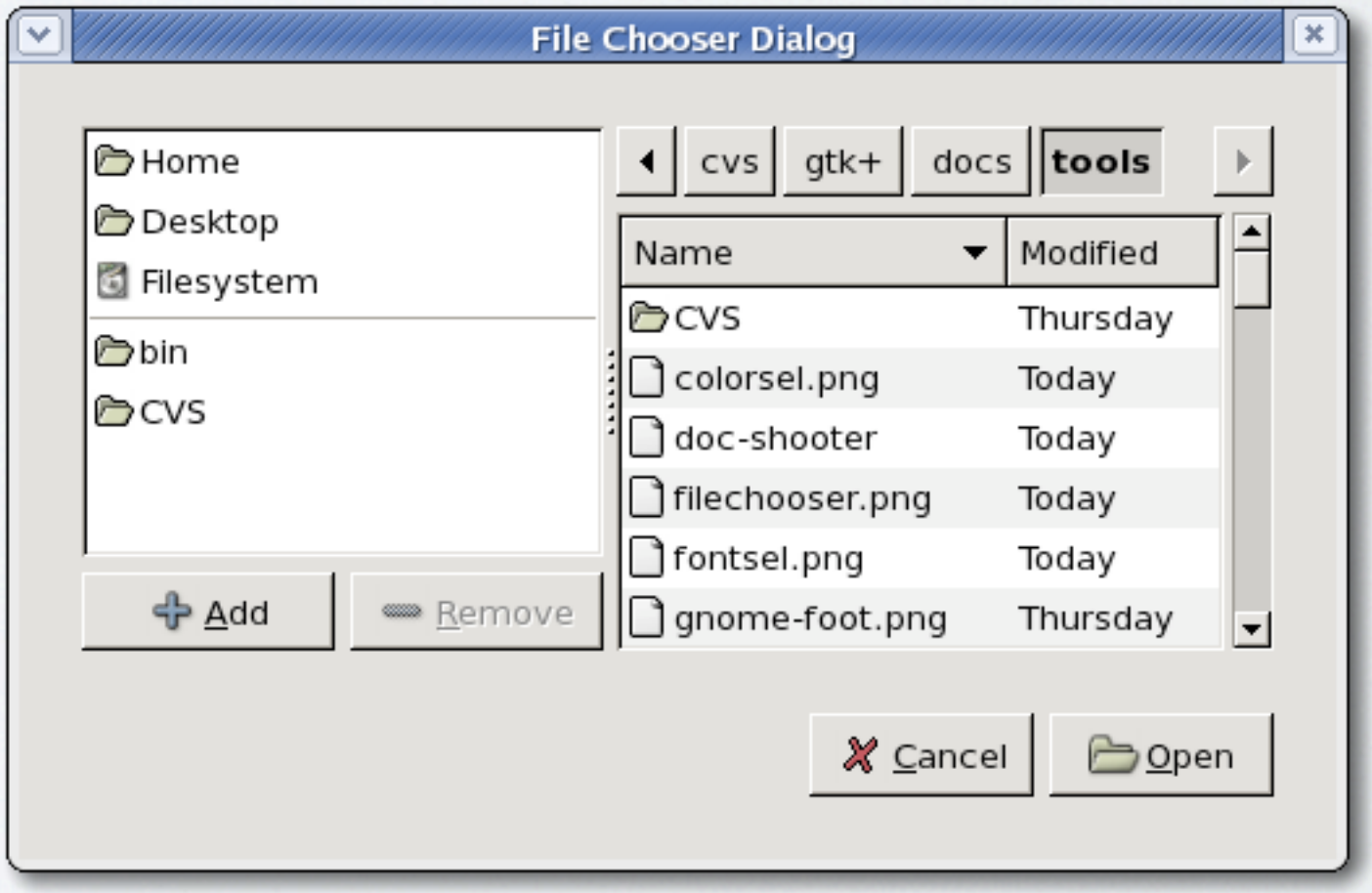
GtkFileChooserButton

Displays current file name and allows opening a file selection dialog to change it.

File selection dialog can have custom preview widget.

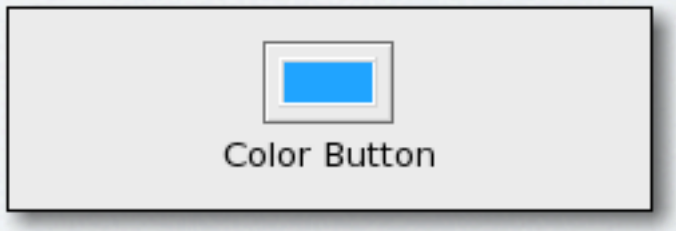


GtkFileChooserDialog

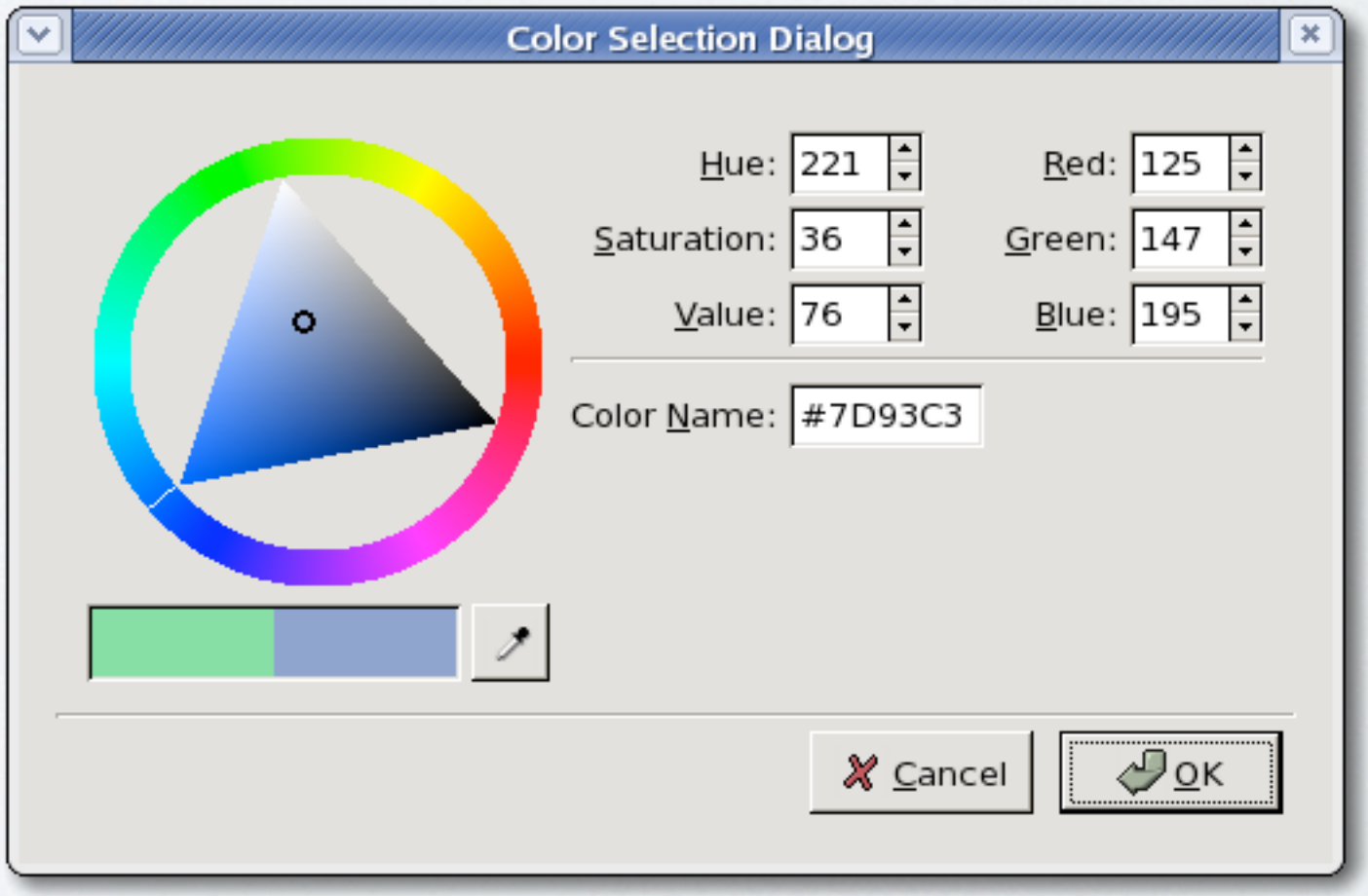


GtkColorButton

Displays the currently selected color and allows opening a color selection dialog to change the color.

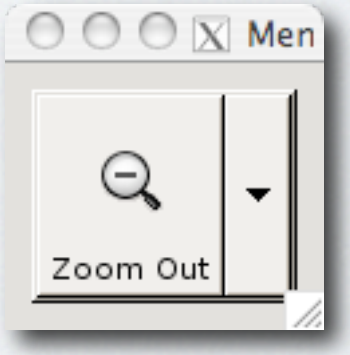


GtkColorSelectionDialog



GtkMenuToolButton

A tool button and a small additional button with an arrow. When clicked, the arrow button pops up a dropdown menu.

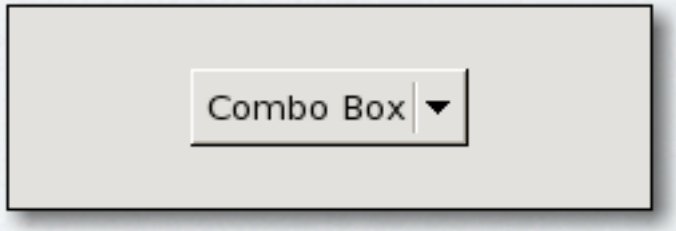


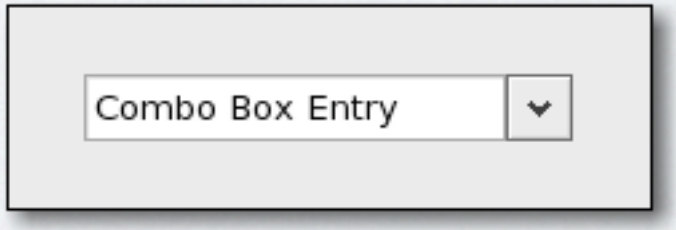
GtkComboBox

Uses model-view architecture, so that model and display can be customized.

Can display flat list or tree structure, for example.

GtkComboBoxEntry allows for editable text.





GtkUIManager

Provides a way to construct a user interface (menus and toolbars) from one or more XML UI definitions.

The most remarkable feature of is that it can overlay a set of menu items and tool items over another one, and de-merge them later.

```
<ui>
  <menubar name='MenuBar'>
    <menu action='FileMenu'>
      <menuitem action='New'/>
      <menuitem action='Open'/>
      <menuitem action='Save'/>
      <menuitem action='SaveAs'/>
      <separator/>
      <menuitem action='Quit'/>
    </menu>
 ...
```

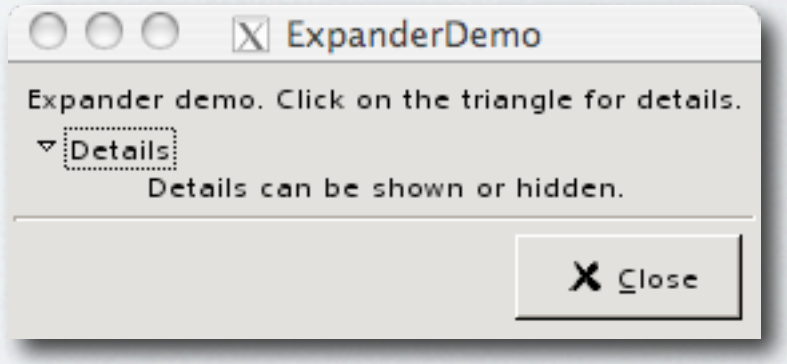
GtkIconView

Displays a list model as a grid of icons with labels.

Allows navigation and selection with arrows keys and rubber-band selection.

GtkExpander

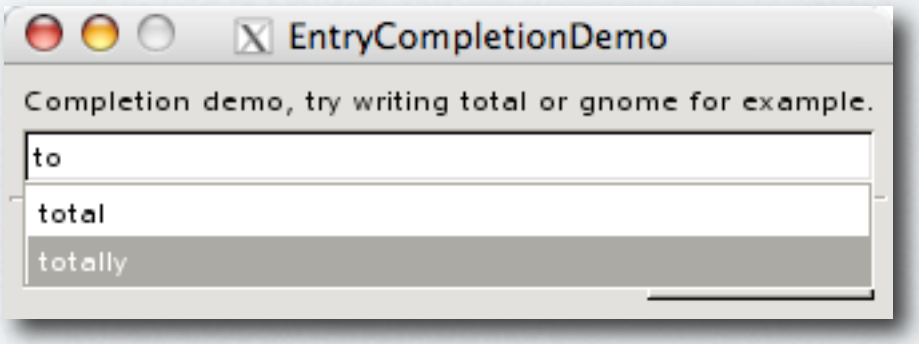
Provides a way to hide and show a child widget by clicking on the expander triangle.



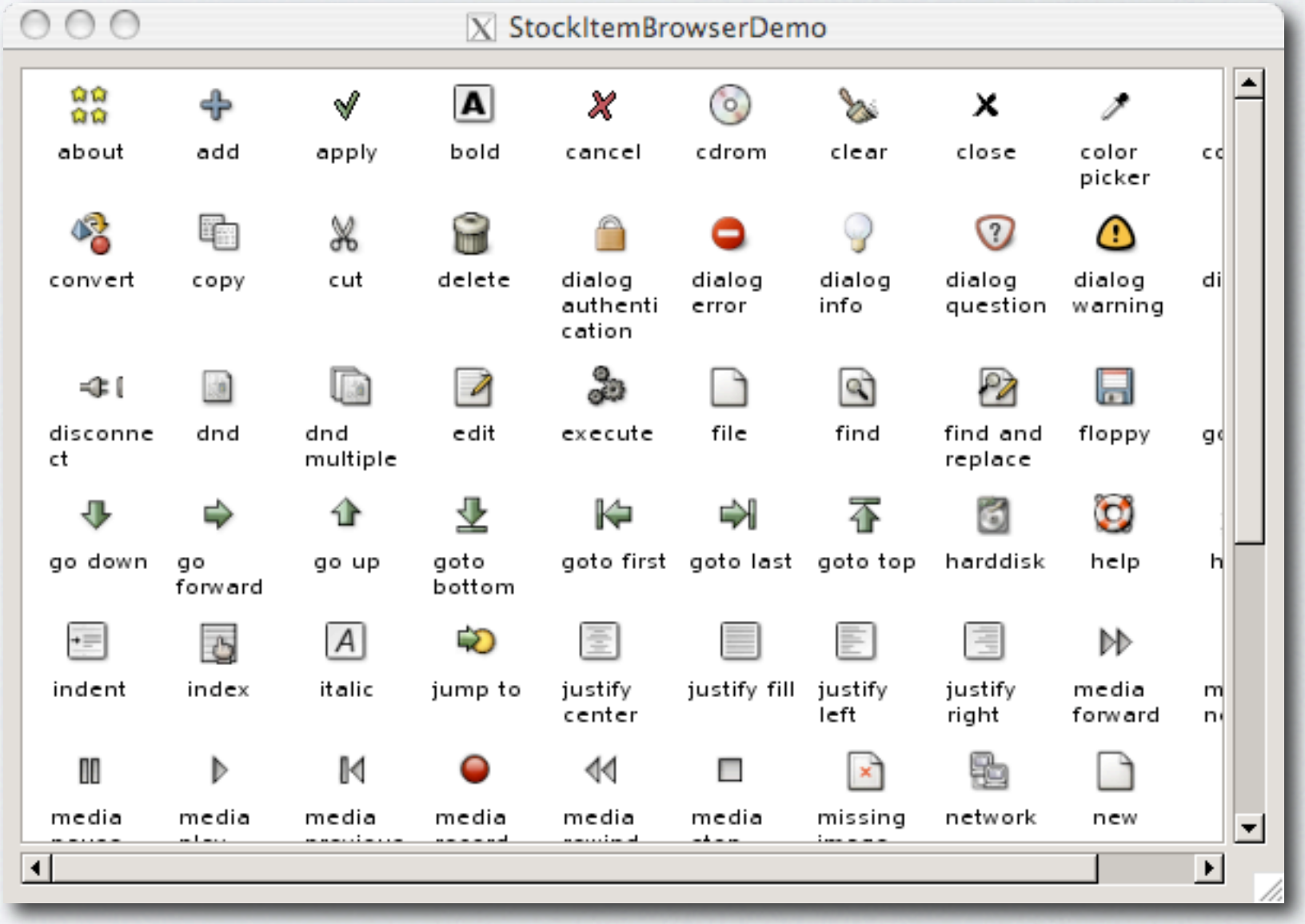
GtkEntryCompletion

Adds completion functionality to GtkEntry with custom layout and matching.

Can “remember” new entries and also display accelerator actions in the dropdown.



Stock Items



Model/View Example

Let's look at a simple example that illustrates some important principles of new model-view architecture behind behind lists, trees, and other widgets.

Warning, code ahead...

Model/View Example

We need to create a data model. We will use GtkListStore since we do not need hierarchical data. The model will have several fields.

```
$store = new GtkListStore(
    GdkPixbuf::gtype, // icon
    Gtk::TYPE_STRING, // title
    Gtk::TYPE_STRING, // category
    Gtk::TYPE_BOOLEAN,// works?
    Gtk::TYPE_LONG    // development progress (percent)
);
```

Model/View Example

We will need another list store that will contain items for the combo box. It only needs one field.

```
$categories = new GtkListStore(Gtk::TYPE_STRING);
$categories->append(array('Editors'));
$categories->append(array('Games'));
$categories->append(array('Utilities'));
$categories->append(array('Office'));
```

Model/View Example

Once we have the model, we need to create the widget that will display it.

```
//View is needed to display them
$view = new GtkTreeView($store);
```

The view widget will display columns of data. Each column can display one or more fields from the model.

Model/View Example

The actual rendering of data is done by an object called cell renderer.

- knows how to draw information of specific type
- configured through attributes, the values for which come from data model

```
// Column: Icon
$rendererPixbuf = new GtkCellRendererPixbuf();
$columnIcon = new GtkTreeViewColumn(
    'Icon',           // title
    $rendererPixbuf, // the renderer
    'pixbuf',         // use this property
    0                 // data is in this model field
);
$view->append_column($columnIcon);
```

Model/View Example

Here is the next column. Here we want to make text editable.

```
// Column: Name
$rendererText = new GtkCellRendererText();
$rendererText->set_property('editable', true);
$rendererText->connect('edited', 'name_edited', $store);

$columnName = new GtkTreeViewColumn(
    'Name',             // title
    $rendererText,      // the renderer
    'text',             // use this property
    1                   // data is in this model field
);
$view->append_column($columnName);
```

Model/View Example

This is the function that will be called we finish editing the name.

```
function name_edited($renderer, $row, $text, $model) {
  // set model field 'name' (1)
  // to the uppercased edited text
  $model->set($model->get_iter($row), 1, strtoupper($text));
}
```

Or, through magic of PHP object model:

```
function name_edited($renderer, $row, $text, $model) {
    $model[$row][1] = strtoupper($text);
}
```

Model/View Example

Category column is a little more complex, since we need to hook up combo box with another model.

```
// Column: Category
$rendererCategory = new GtkCellRendererCombo();
$rendererCategory->set_property('model'       , $categories);
$rendererCategory->set_property('text-column', 0);
$rendererCategory->set_property('editable'    , true);
$rendererCategory->connect('edited', 'category_edited', $store);

$columnCategory = new GtkTreeViewColumn(
    'Category',          // title
    $rendererCategory, // the renderer
    'text',              // use this property
    2                    // data is in this model column
);
$columnCategory->set_expand(true);
$columnCategory->set_property('resizable', TRUE);
$view->append_column($columnCategory);
```

Model/View Example

The toggle renderer uses boolean model field. We connect a callback to change the value on click.

```
// Column: Works?
$rendererWorks = new GtkCellRendererToggle();
$rendererWorks->set_property('activatable', true);
$rendererWorks->connect('toggled', 'works_toggled', $store);

$columnWorks = new GtkTreeViewColumn(
    'Works?',          // title
    $rendererWorks,    // the renderer
    'active',          // use this property
    3                  // data is in this model field
);
$view->append_column($columnWorks);

function works_toggled($renderer, $row, $store) {
    $store[$row][3] = !$store[$row][3]; // invert value
}
```

Model/View Example

The progress info column is easy.

```
// Column: Development progress
$rendererProgress = new GtkCellRendererProgress();

$columnProgress = new GtkTreeViewColumn(
    'Progress',          // title
    $rendererProgress, // the renderer
    'value',             // use this property
    4                    // data is in this model column
);
$columnProgress->set_expand(true);
$view->append_column($columnProgress);
```

Model/View Example

All that's left is set up the main window and put the view in it.

```
$wnd = new GtkWindow();
$wnd->set_default_size(400, -1);
$wnd->set_title('Applications');
$wnd->connect_simple('destroy', array('Gtk', 'main_quit'));
$wnd->add($view);
$wnd->show_all();
Gtk::main();
```

Model/View Example

That's it! Now you know enough to be dangerous.

Deployment

Once you have an app, you need an easy way to deploy it.

On Win32 platforms, the best option is Gnope.

Allows transparent installation of PHP-GTK 2 and applications through Gnope PEAR channel.

http://gnope.org/

Now and Future

API Completeness (at 89% coverage currently)

Documentation (at 44% coverage currently)

Providing abilities to:

- write custom models and cell renderers
- creating new custom widgets with signals and properties
- override virtual methods

Performance optimizations

And much more

Resources

http://gtk.php.net/

http://gtk.php.net/manual/

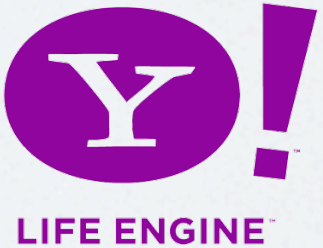
http://www.gnope.org/

http://www.cweiske.de/phpgtk.htm

http://mail.gnome.org/archives/gtk-list/

#php-gtk IRC channel on Freenode network

Thank You!
Merci!



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