The Window Manager Construction Toolkit

KWin goes Scripting

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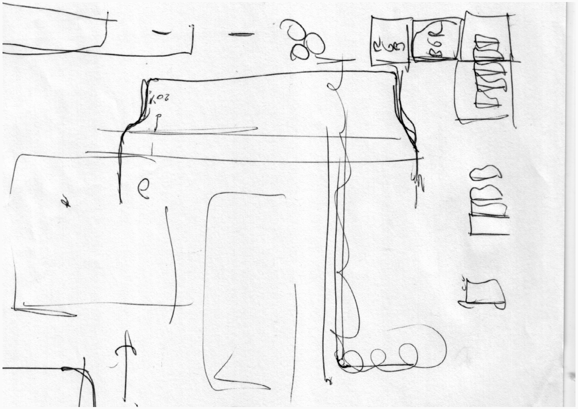
Agenda

Agenda

Tokamak IV

Akademy 2010



GSoC as Prototype

Google Summer of Code 2010

- Implemented Scripting Support
- API hand-crafted
- API Documentation hand-written
- Strong interweaving of core and scripting
- Scripts invoked at wrong places
- Scripting module undocumented

Prototype

This prototype should never have been merged!

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Going Generic: Animation Effect

Issues with Effects

- Many Effects to animate window state changes
- Code got copied over and adjusted
- Changes to Effect System difficult to implement
- Same errors present in many Effects

AnimationEffect

- Base implementation handling animation
- Effects only react on state changes
- Better suited for 3rd Party usage

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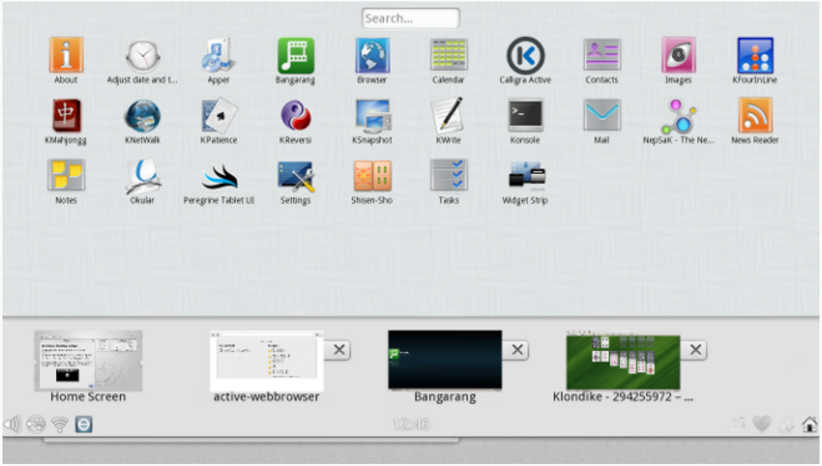
Plasma Active

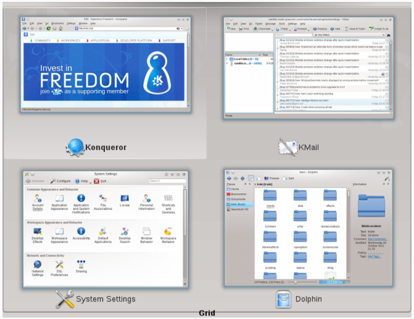


Agenda

Window Switcher

Window Switcher Problematic

- Not one size fits all possible
- Caption length very different
- Thumbnails only useful if large
- Icons partially useful
- Effects do not use a toolkit



Solution since 4.8

- Windows are provided in a Model
- QML for GUI
- DeclarativeItem to render a thumbnail
- Documentation on Techbase http://ur1.ca/9jzyw

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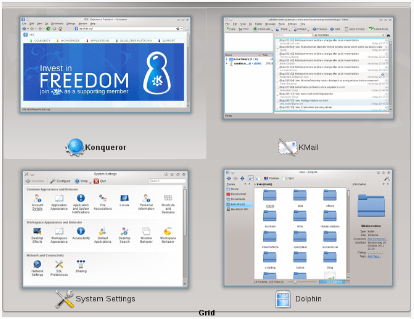

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Desktop Switcher

Window Switcher's Little Brother

- Shares Framework with Window Switcher
- QML Support since 4.9
- Only one available layout
- DeclarativeItem for Desktop Preview missing

QtScript

Primary Scripting Functionality

- Clients exported to Script
- Wrapper around Workspace
- Full access to KWin's Options
- Everything QProperty based
- Script (un)loading at Runtime through D-Bus
- Global Shortcut Support
- Screen Edge Support
- Configuration Support

```
function synchronizeSwitcher(c) {
    c.skipSwitcher = c.skipTaskbar;
}

function setup(c) {
    synchronizeSwitcher(c);
    c.skipTaskbarChanged.connect(c,
 synchronizeSwitcher);
}

workspace.clientAdded.connect(setup);
// connect all existing clients
var clients = workspace.clientList();
for (var i=0; i<clients.length; i++) {
    setup(clients[i]);
}
```

Declarative Scripts

GUI for QtScript

- Same API exported as for QtScripts
- Support Plasma Components
- Support Window Switcher's Thumbnail Item
- Limited Usage: no "real" windows

```
import QtQuick 1.0
import org.kde.kwin 0.1 as KWin
ListView {
    objectName: "listView"
    model: clientModel
    delegate: KWin.ThumbnailItem {
        wId: windowId
        width: 200
        height: 200
    }
}
```

Effect Scripts

Generic++

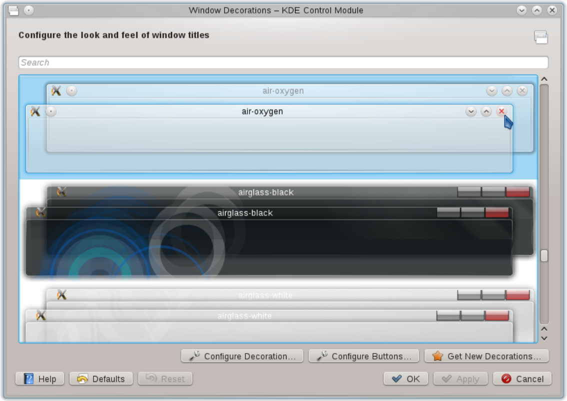
- Based on AnimationEffect
- QtScript based
- No Script execution in rendering phase
- API close to KWin Scripts
- No access to Workspace
- Access to Windows instead of Clients
- Not as elaborated as KWin Scripts

```
var fadeInTime, fadeOutTime, fade;
function loadConfig() {
    fadeInTime = animationTime(
effect.readConfig("FadeInTime", 150));
    fadeOutTime = animationTime(
effect.readConfig("FadeOutTime", 150));
    fade = effect.readConfig(
"FadeWindows", true);
}
loadConfig();
effect.configChanged.connect(
    function() {loadConfig();});
effects.windowAdded.connect(function(w) {
    if (fade && isFadeWindow(w)) {
        effect.animate(w,
 Effect.Opacity, fadeInTime, 1.0, 0.0);
    }
});
```

Window Decorations

Aurorae 3

- Rewritten in QML
- Decoration Bindings a side-product
- Theme Preview is interactive



More To Come

QML theme support under development

Agenda

Dogfoding

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Options

Historic Artifacts

- Options a singleton to all Config values
- Implemented access to public member variables
- Dependencies between options not ensured
- Design present in first commit

Fixed with Scripts

- Member variables are private
- Access only through Getters&Setters
- Dependency between options ensured through setters
- QProperties added
- Documentation added

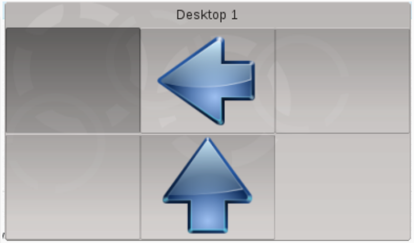
```
setAutoRaise(config.readEntry("AutoRaise", Options::defaultAutoRaise()));
setAutoRaiseInterval(config.readEntry("AutoRaiseInterval", Options::defaultAutoRaiseInterval()));
setDelayFocusInterval(config.readEntry("DelayFocusInterval", Options::defaultDelayFocusInterval()));

setShadeHover(config.readEntry("ShadeHover", Options::defaultShadeHover()));
setShadeHoverInterval(config.readEntry("ShadeHoverInterval", Options::defaultShadeHoverInterval()));
```

Desktop Change OSD

Improvements through Script

- Dropped a Build Option
- Workspace had code to create OSD
- Fixed several bugs
- Removed 700 lines C++ code
- Just 280 lines of QML



Simple Effect

Ported Effects

- Fade
- Fade Desktop
- Prototype for Sheet

More?

Waiting for you!

Simple Effect

Ported Effects

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More?

Waiting for you!

Window Switcher Grid

Present Windows Mode

- Window Switching in Present Windows was a Hack
- Did not work well with Multiple Screens
- Best overview for many windows
- Requires Desktop Effects

Grid Window Switcher Layout

- Does not require Desktop Effects
- Proper Multi-Screen support
- Dropped special handling in effect (180 SLOC)

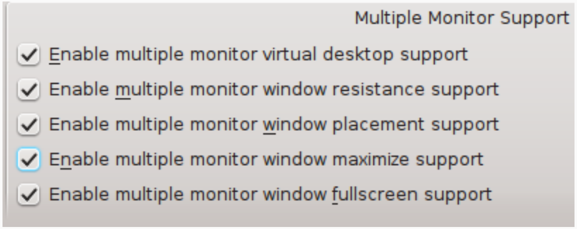
Introduction of QProperties

Preparing for Wayland

- Describes Client's interface
- Adds documentation
- Used by Effect System
- 40 properties on Toplevel
- 37 properties on Client
- 65 properties on Options
- 14 properties on Workspace Wrapper
- Most of Extended Window Manager Hints exported

```
class Client
    : public Toplevel
{
    Q_OBJECT
    /**
     * Whether this Client is active or not. Use Worksp
     * @see Workspace::activateClient
     **/
    Q_PROPERTY(bool active READ isActive NOTIFY active
    /**
     * The Caption of the Client. Read from WM_NAME pro
     * To read only the caption as provided by WM_NAME,
     **/
    Q_PROPERTY(QString caption READ caption NOTIFY cap
    /**
     * Whether the window can be closed by the user. Th
     * Because of that no changed signal is provided.
     **/
    Q_PROPERTY(bool closeable READ isCloseable)
    /**
     * The desktop this Client is on. If the Client is
     **/
    Q_PROPERTY(int desktop READ desktop WRITE setDeskt
```

Multi-Screen Handling

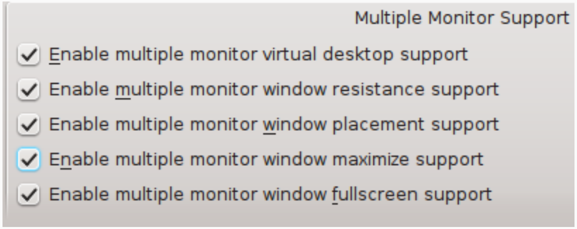

Multiple Monitor Support

- [✓] Enable multiple monitor virtual desktop support
- [✓] Enable multiple monitor window resistance support
- [✓] Enable multiple monitor window placement support
- [✓] Enable multiple monitor window maximize support
- [✓] Enable multiple monitor window fullscreen support

Replaced by Script

Video-Wall is only valid use case.

Multi-Screen Handling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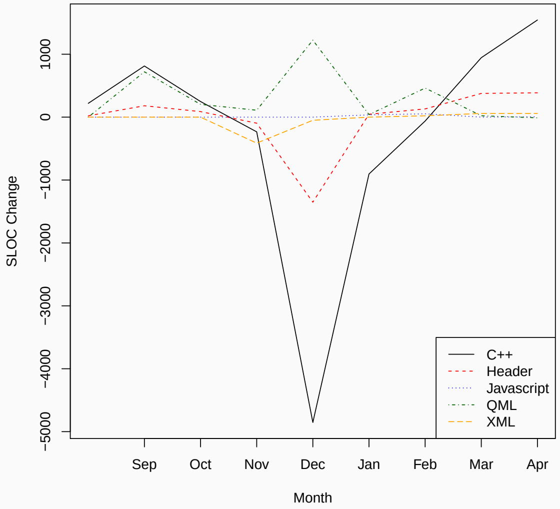
Visualized

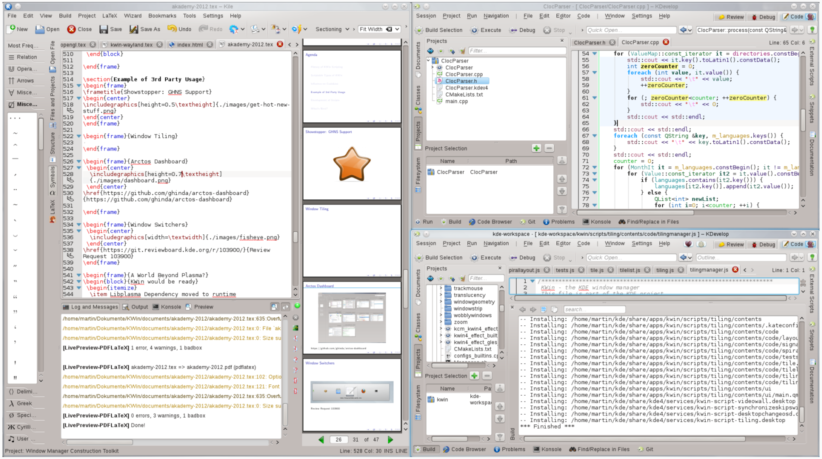


SLOC Change
1000
0
−1000
−2000
−3000
−4000
−5000
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Month
C++
Header
Javascript
QML
XML

Agenda

Showstopper: GHNS Support

Window Tiling



```
\end{block}

\end{frame}

\section{Example of 3rd Party Usage}
\begin{frame}
\frametitle{Showstopper: GHNS Support}
\begin{center}
\includegraphics[height=0.5\textheight]{./images/get-hot-new-stuff.png}
\end{center}
\end{frame}

\begin{frame}{Window Tiling}

\end{frame}

\begin{frame}{Arctos Dashboard}
 \begin{center}
  \includegraphics[height=0.7\textheight]
  {./images/dashboard.png}
 \end{center}
\href{https://github.com/ghinda/arctos-dashboard}
{https://github.com/ghinda/arctos-dashboard}

\end{frame}

\begin{frame}{Window Switchers}
 \begin{center}
  \includegraphics[width=\textwidth]{./images/fisheye.png}
 \end{center}
\href{https://git.reviewboard.kde.org/r/103900/}{Review
Request 103900}
\end{frame}

\begin{frame}{A World Beyond Plasma?}
\begin{block}{KWin would be ready}
 \begin{itemize}
  \item Libplasma Dependency moved to runtime
```

```
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:635:Overfu
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:0: File `ak
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:0: Size su
[LivePreview-PDFLaTeX] 1 error, 4 warnings, 1 badbox


[LivePreview-PDFLaTeX] akademy-2012.tex => akademy-2012.pdf (pdflatex)
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:102: Optio
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:121: Font
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:635:Overfu
/home/martin/Dokumente/KWin/documents/akademy-2012/akademy-2012.tex:0: Size su
[LivePreview-PDFLaTeX] 0 errors, 3 warnings, 1 badbox
[LivePreview-PDFLaTeX] Done!
```

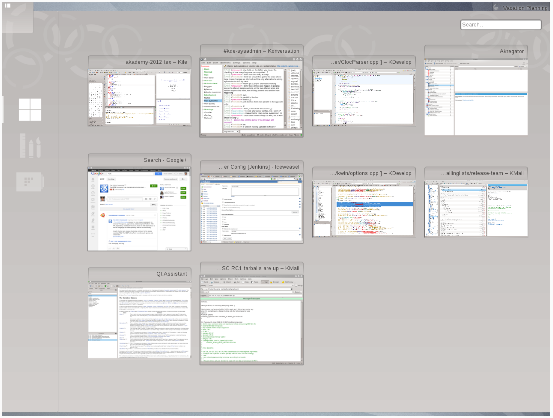
```
    for (ValueMap::const_iterator it = directories.constBeg
        std::cout << it.key().toLatin1().constData();
        int zeroCounter = 0;
        foreach (int value, it.value()) {
            std::cout << "\t" << value;
            ++zeroCounter;
        }
        for (; zeroCounter<counter; ++zeroCounter) {
            std::cout << "\t" << 0;
        }
        std::cout << std::endl;
    }
    std::cout << std::endl;
    foreach (const QString &key, m_languages.keys()) {
        std::cout << "\t" << key.toLatin1().constData();
    }
    std::cout << std::endl;
    counter = 0;
    for (MonthIt it = m_languages.constBegin(); it != m_lar
        for (Value::const_iterator it2 = it.value().constBe
            if (languages.contains(it2.key())) {
                languages[it2.key()].append(it2.value());
            } else {
                QList<int> newList;
                for (int i=0; i<counter; ++i) {
```

```
/**************************************************************
 KWin - the KDE window manager
 This file is part of the KDE project
```

```
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/.kateconfi
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/layou
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/signa
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/spira
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/tests
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/tile.
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/tilel
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/tilir
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/code/tilir
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/ui
-- Installing: /home/martin/kde/share/apps/kwin/scripts/tiling/contents/ui/main.qm
-- Installing: /home/martin/kde/share/kde4/services/kwin-script-videowall.desktop
-- Installing: /home/martin/kde/share/kde4/services/kwin-script-synchronizeskipswi
-- Installing: /home/martin/kde/share/kde4/services/kwin-script-desktopchangeosd.c
-- Installing: /home/martin/kde/share/kde4/services/kwin-script-tiling.desktop
*** Finished ***
```

https://github.com/mgottschlag/kwin-tiling

Arctos Dashboard


Vacation Planning
Search..
akademy-2012.tex – Kile
#kde-sysadmin – Konversation
...er/ClocParser.cpp] – KDevelop
Akregator
Search · Google+
...er Config [Jenkins] · Iceweasel
.../kwin/options.cpp] – KDevelop
...ailinglists/release-team – KMail
Qt Assistant
...SC RC1 tarballs are up – KMail

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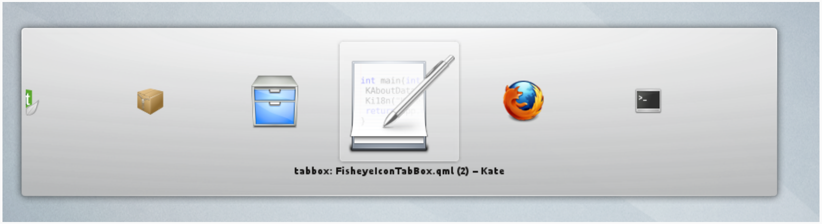
Window Switchers



Review Request 103900

A World Beyond Plasma?

KWin would be ready

- Libplasma Dependency moved to runtime
- With Frameworks hardly any dependencies

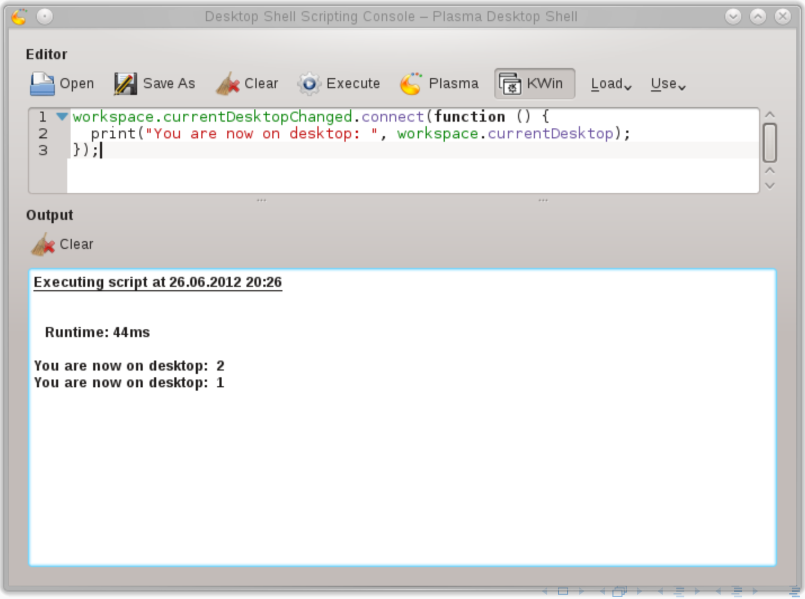
Razor-qt

The free and open source lightweight desktop environment

Unity

Agenda

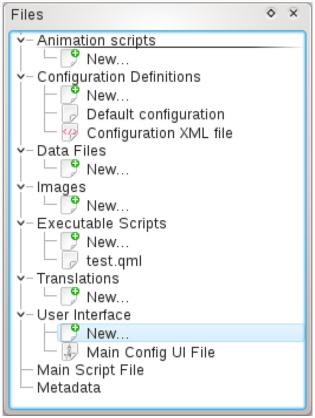
WM Console



```
workspace.currentDesktopChanged.connect(function () {
  print("You are now on desktop: ", workspace.currentDesktop);
});
```

```
Executing script at 26.06.2012 20:26

  Runtime: 44ms

You are now on desktop:  2
You are now on desktop:  1
```

Plasma Package Structure


Files
- Animation scripts
  - New...
- Configuration Definitions
  - New...
  - Default configuration
  - Configuration XML file
- Data Files
  - New...
- Images
  - New...
- Executable Scripts
  - New...
  - test.qml
- Translations
  - New...
- User Interface
  - New...
  - Main Config UI File
- Main Script File
- Metadata

Plasma Package Documentation: http://ur1.ca/9kkbe

Documentation

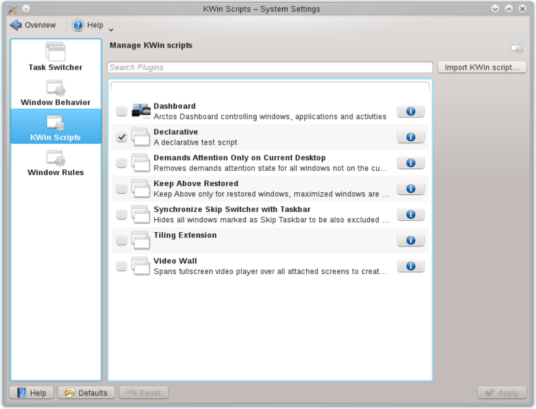
Techbase

- Development/Tutorials/KWin/WindowSwitcher
- Development/Tutorials/KWin/Scripting
- .../API_4.9

kdeexamples git repository

- kde:kdeexamples – kwin/scripts
- Block Compositing for Fullscreen Windows
- Demands Attention only on Current Desktop
- Keep Above only for restored windows

Deployment



Manage KWin scripts

- [ ] **Dashboard** Arctos Dashboard controlling windows, applications and activities
- [✓] **Declarative** A declarative test script
- [ ] **Demands Attention Only on Current Desktop** Removes demands attention state for all windows not on the cu…
- [ ] **Keep Above Restored** Keep Above only for restored windows, maximized windows are …
- [ ] **Synchronize Skip Switcher with Taskbar** Hides all windows marked as Skip Taskbar to be also excluded …
- [ ] **Tiling Extension**
- [ ] **Video Wall** Spans fullscreen video player over all attached screens to creat…

For everything else

plasmapkg

Please Test

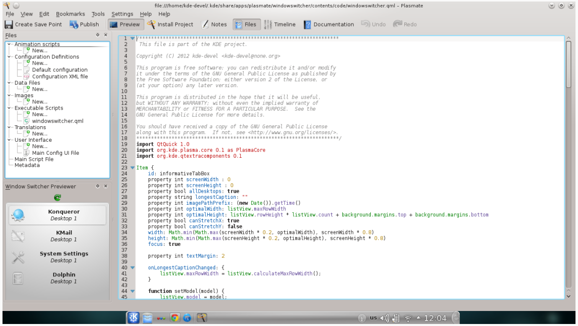
We need more dogfood!

Agenda

Plasmate Integration

Google Summer of Code Project

- Support for Window Switcher
- Support for QtScript
- Support for Declarative Scripts
- Preview for what makes sense

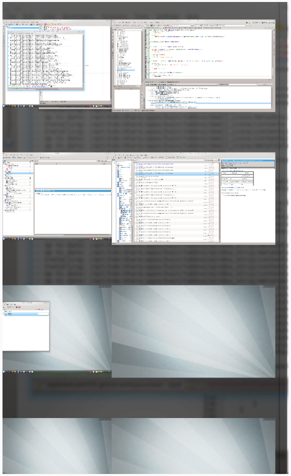


```
/*****************************************************************************
 This file is part of the KDE project.

Copyright (C) 2012 kde-devel <kde-devel@none.org>

This program is free software; you can redistribute it and/or modify
it under the terms of the GNU General Public License as published by
the Free Software Foundation; either version 2 of the License, or
(at your option) any later version.

This program is distributed in the hope that it will be useful,
but WITHOUT ANY WARRANTY; without even the implied warranty of
MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  See the
GNU General Public License for more details.

You should have received a copy of the GNU General Public License
along with this program.  If not, see <http://www.gnu.org/licenses/>.
*****************************************************************************/
import QtQuick 1.0
import org.kde.plasma.core 0.1 as PlasmaCore
import org.kde.qtextracomponents 0.1

Item {
    id: informativeTabBox
    property int screenWidth : 0
    property int screenHeight : 0
    property bool allDesktops: true
    property string longestCaption: ""
    property int imagePathPrefix: (new Date()).getTime()
    property int optimalWidth: listView.maxRowWidth
    property int optimalHeight: listView.rowHeight * listView.count + background.margins.top + background.margins.bottom
    property bool canStretchX: true
    property bool canStretchY: false
    width: Math.min(Math.max(screenWidth * 0.2, optimalWidth), screenWidth * 0.8)
    height: Math.min(Math.max(screenHeight * 0.2, optimalHeight), screenHeight * 0.8)
    focus: true

    property int textMargin: 2

    onLongestCaptionChanged: {
        listView.maxRowWidth = listView.calculateMaxRowWidth();
    }

    function setModel(model) {
        listView.model = model;
```

Support for Desktop Thumbnails

Declarative Item

- Review Request 104441
- Requires changes to GL rendering
- Prerequisite to drop BoxSwitch effect



Unit Tests

Scripts to run inside KWin

- Classic Unit Testing for Window Managers difficult
- Script could be injected into running KWin instance
- Adjust Config Options
- Simulate user interaction
- Verify external changes adjust KWin's internal state

Access to OpenGL?

What about WebGL?

- WebGL binding easy to generate
- What would be the usecase?
- Would conflict with KWin's GL abstraction
- Requires script execution in rendering loop

Better Approach

- Bindings for KWin's GL abstraction
- Extend AnimationEffect to support GL

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Better Approach

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Open for Ideas

KWin Development Bof

Thursday, July 5th
10:30 in Room 226