What's new in QtWebKit in Qt 5
(Simon Hausmann)
WebKit in a nutshell
Statistics

• WebKit:
  • ~1.5 Million lines of code
  • ~90 Commits per day

• Qt 5 release modules (w/o WK):
  • ~3.5 Million lines of code
  • qtbase: ~19 commits per day
Summary

- WebKit is half the size of Qt
- It's changing rapidly
So what has changed over the past months?
A LOT!
(Let's look at the diff)
Outline

- WebCore
- Qt C++ API
- Process separation
- QML2 integration
- Future thoughts
WebCore features

- Make sure to subscribe to weekly updates at planet.webkit.org

- Examples:
  - Mathml
  - CSS Regions
  - Shadow DOM
  - window.requestAnimationFrame()
  - remote web inspector
  - Too many more to count!
- New faster CSS lexer
- Massive reductions in DOM/CSS memory usage
- 25% faster line breaking for complex text
- 8 times faster querySelector
What features am I using?
Outline

- WebCore
- Qt C++ API
- Process separation
- QML2 integration
- Future thoughts
• No big changes
• Mostly source compatible
• Widget based API in QtWebKitWidgets module
Rendering pipeline improvements

- QGraphicsView based layer composition replaced with OpenGL based compositor
  - Small kernel
  - Easy to adapt to specific GPUs
  - Will allow for integration with CSS shaders/filters
  - Supports tiled layers
  - TextureMapper also supports software fallback
GraphicsWebView* webView = new QGraphicsWebView;
webView->setResizesToContents(true);

graphicsView->setViewport(new QGLWidget);
Outline

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Problems with QtWebKit

- Single threaded
- Delay in rendering can cause stutter when scrolling
- API mixes high-level and low-level needs
- Hard to secure even with threaded engine
Introducing WebKit2

- Separate front-end (UIProcess) from back-end (WebProcess)
- Messages passed via local sockets
- Data transferred via shared memory
WebKit2 process responsibilities

- **WebProcess:**
  - Runs one or multiple web pages
  - Executes JavaScript
  - Lays out content
  - Renders into shared buffers
  - Can be sandboxed (future)

- **UIProcess:**
  - It's your application process, running QApplication, QML
  - Never blocks main thread for any web related activity
  - Always responsive to user feedback
WebKit2 Networking

- WebProcess initiates network connections
- No more custom QNetworkAccessManager
- But will allow application provided schemes in the future
WebKit2 Hybrid (future)

- No more QObject bindings (across process boundaries)
- Standard postMessage() API between web content and QML
- JavaScript on both ends
WebKit2 Rendering

- Web process has tree of layers
- Layer content rendered in software
- Uploaded into shared GPU memory
- Layer tree replicated in Qt application process
- Composited in QML2 scene with OpenGL texture mapper
- Called coordinated graphics system
- WebGL rendered into off-screen GL surface in web process
- Surface is shared between processes
- WebGL canvas layer composited as part of regular layer tree
- Maybe serialize GL commands in the future?
WebKit2 rendering result

- It's fast
- Always responsive
- Minimize GPU texture uploads
Outline

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• Philosophy:
  • Don't try to do too many things at the same time
  • Implement one well-defined behaviour
  • Less to tune, more things work out of the box
New QML2 API

- WebView is a QML flickable
- Supports pinch/pan gestures out of the box
- Viewport meta-tag out of the box
- Touch adjustment
- Tap highlighting
Quick Demo
Low-level API

- Allow for products that integrate WebKit deeply into the system
- Not as easy to use, but more powerful
Known issues...

- Audio/Video support
- HW acceleration for 2D Canvas
• Many things have changed

• It's important to stay up-to-date with WebKit

• Stay in touch with us in the WebKit project
Thank you! Questions?