GammaRay

Taking a deeper look into your application

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Runtime introspection for Qt applications
How do I use it?

• Similar to a debugger
  - Launch application with GammaRay
  - Attach at runtime

• GUI, QtCreator plugin or command line interface available

• Works locally and remotely

• Requires no instrumentation or modifications of the application

• Needs a probe DLL matching the used Qt version exactly
What can I do with it?
Qt Quick Textures

• Problems
  - High texture memory consumption
  - Sub-optimal render performance

• Investigation
  - Are texture atlases used properly?
  - Is there unnecessary texture data?

• Counter-Measures
  - Tweak texture atlas parameters: QSG_ATLAS_[HEIGHT|WIDTH]
  - Use BorderImage for repeating content
  - Don’t use transparent textures to simplify layouting
Qt Quick Textures
Qt Widget Tab Focus Chains

• Problem
  - Tab order in large dialogs is wrong/confusing/incomplete
  - Manual testing of this is tedious

• Investigation
  - GammaRay has tab order visualization
  - “Crossing” transitions are highlighted
  - Inspection of various focus properties for problematic widgets
Qt Widget Tab Focus Chains
QML Binding Loops

• Problem
  - Indirect circular dependencies in QML bindings
  - Implicit dependencies inside Qt Quick layouting code
  - Runtime warning only shows source of detected loop, but not the dependencies
  - Manual access to that requires digging deep into Qt internals

• Investigation
  - GammaRay provides access to full dependency tree
  - Source navigation gets you quickly to the right place to fix things
# QML Binding Loops

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>Depth</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>root.width</td>
<td>150</td>
<td></td>
<td>/kde5/src/GammaRay/examples/quick-bindings/quick-bindings.qml:5:12</td>
</tr>
<tr>
<td>child.width</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>root.width</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>child.anchors.leftMargin</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>child.anchors.rightMargin</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>child.height</td>
<td>140</td>
<td></td>
<td></td>
</tr>
<tr>
<td>root.height</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>child.anchors.topMargin</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>child.anchors.bottomMargin</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Out-of-control Timers

• Problem
  - Backtrace only indicates activity caused by a timer, but not which one or where it was started from

• Investigation
  - List active timers
  - Allow to navigate to source of timer creation
  - Verify hypothesis by modifying timer properties at runtime
# Out-of-control Timers

<table>
<thead>
<tr>
<th>Object Name</th>
<th>State</th>
<th>Total Wakeups</th>
<th>Wakeups/Sec</th>
<th>Time/Wakeup [uSecs]</th>
<th>Max Wakeup Time [uSecs]</th>
<th>Timer ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>QTimer[0x158f750]</td>
<td>Repeating (0 ms)</td>
<td>28388</td>
<td>1319.3</td>
<td>349.5</td>
<td>734</td>
<td>3</td>
</tr>
<tr>
<td>MyUpdateTimer[0x1499770]</td>
<td>Repeating (0 ms)</td>
<td>27070</td>
<td>1319.3</td>
<td>N/A</td>
<td>N/A</td>
<td>5</td>
</tr>
<tr>
<td>QDefaultAnimationDriver[0x1649...</td>
<td>Repeating (16 ms)</td>
<td>14</td>
<td>21.6</td>
<td>N/A</td>
<td>N/A</td>
<td>6</td>
</tr>
<tr>
<td>QDefaultAnimationDriver[0x1649...</td>
<td>Repeating (16 ms)</td>
<td>14</td>
<td>4.1</td>
<td>N/A</td>
<td>N/A</td>
<td>2</td>
</tr>
<tr>
<td>QDefaultAnimationDriver[0x1649...</td>
<td>Repeating (16 ms)</td>
<td>17</td>
<td>2.8</td>
<td>N/A</td>
<td>N/A</td>
<td>5</td>
</tr>
<tr>
<td>QDefaultAnimationDriver[0x1649...</td>
<td>Repeating (16 ms)</td>
<td>8</td>
<td>1.6</td>
<td>N/A</td>
<td>N/A</td>
<td>8</td>
</tr>
<tr>
<td>QTimer[0x1214f30]</td>
<td>Inactive (20 ms)</td>
<td>5</td>
<td>0.4</td>
<td>20.7</td>
<td>202</td>
<td>-1</td>
</tr>
<tr>
<td>QTimer[0x7f3ff005d30]</td>
<td>Inactive (20 ms)</td>
<td>5</td>
<td>0.4</td>
<td>10.7</td>
<td>44</td>
<td>-1</td>
</tr>
<tr>
<td>QPMCache[0x7fd400030c740]</td>
<td>Repeating (30000 ms)</td>
<td>1</td>
<td>0</td>
<td>N/A</td>
<td>N/A</td>
<td>4</td>
</tr>
</tbody>
</table>
How can I get it?
How do I get GammaRay?

• https://www.kdab.com/gammaray
• Dual license: GPL + commercial
• Included in Qt Automotive Suite
Questions?