INSTITUTO NOKIA DE TECNOLOGIA

Considering Tiling for a better User Experience

Kenneth Rohde Christiansen
WebKit Code Camp, Wiesbaden, December 2009

openBossa
Software in a creative way

SOMETHING THAT I HAVE BEEN WORKING ON

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WHO AM I?

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A TILED

BACKING STORE

What are the problems we are facing today?

The background for considering tiling

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WE PAINT THINGS WE'VE ALREADY PAINTED WHEN SCROLLING BACK

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CLEVER TILING CAN SOLVE THESE ISSUES

How to accomplish this

What is tiling anyway?

Cache and join paint events

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Cache what you paint in image tiles

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This can be hardware accelerated!

My experiment

My basic algorithm

As an experiment, implement it on the WebKit side

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Why not just make viewport == contents size?

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Why not just make viewport == contents size?

Because we use WebCore for drawing our scrollbars and that makes a whole lot of sense ... theming ... etc

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- Put in cache, blit to screen

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Each tile stores it's covered area as well as a dirty area.

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Each tile stores it’s covered area as well as a dirty area.

On update, we update the dirty area of the intersected tiles. If it has such an area already, the bounding rect is uses as the new area. Remember, we try to avoid calling into WebCore unnecessarily

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Furthermore, if the dirty area == covered area, remove it from cache

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On update and scroll:

Update all tiles, blit what is in the cache, create tiles for what is not

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On update and scroll:

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That is more of less the basic algorithm, but there are some problems.

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Scrollbars

Paint the scrollbars separately, make sure updates to them do not invalidate any tiles. These are not tiled in my implementation!

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Scrollbars

Paint the scrollbars separately, make sure updates to them do not invalidate any tiles. These are not tiled in my implementation!

Enlarging tiles

When enlarging we much make sure that we don't cover an area already in the cache, so I need to know what area is cached.

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Cache growth

Storing the whole page in the cache would be expensive, memory-wise, so the cache has a max size.

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The solution is to give each tile an age and increase the age when not used, and reset it when being blit.

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Cache growth

Storing the whole page in the cache would be expensive, memory-wise, so the cache has a max size.

The solution is to give each tile an age and increase the age when not used, and reset it when being blit.

Before adding a new tile, we reserve the needed space for it, removing the oldest tiles.

So what is the preliminary results?

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THE TILING IS FASTER!

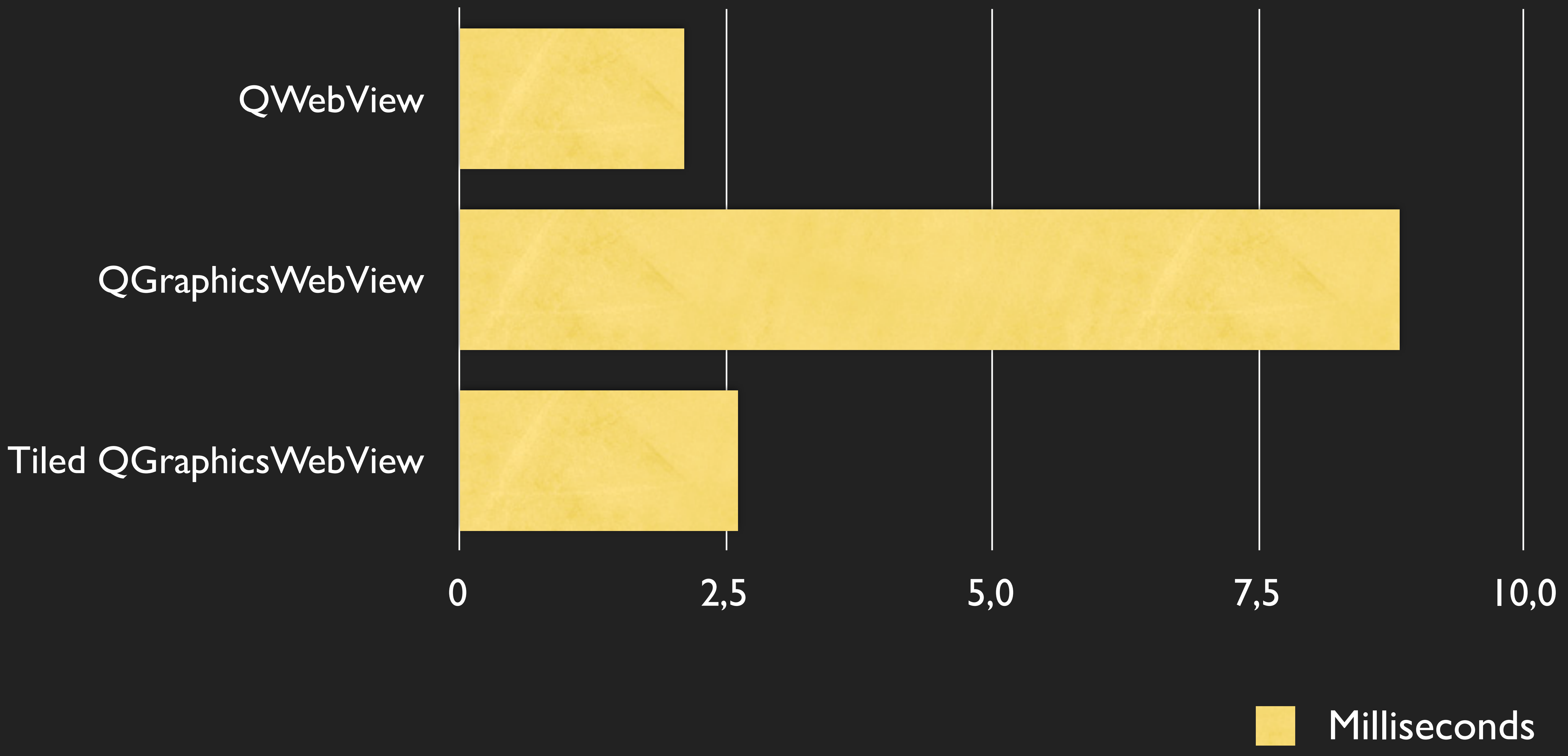
But we had some surprises as well.

NON-TILED QGRAPHICSWEBVIEW IS EXTREMELY SLOW

Where are se' numbers?

Back up your claims dude!

Simple painting



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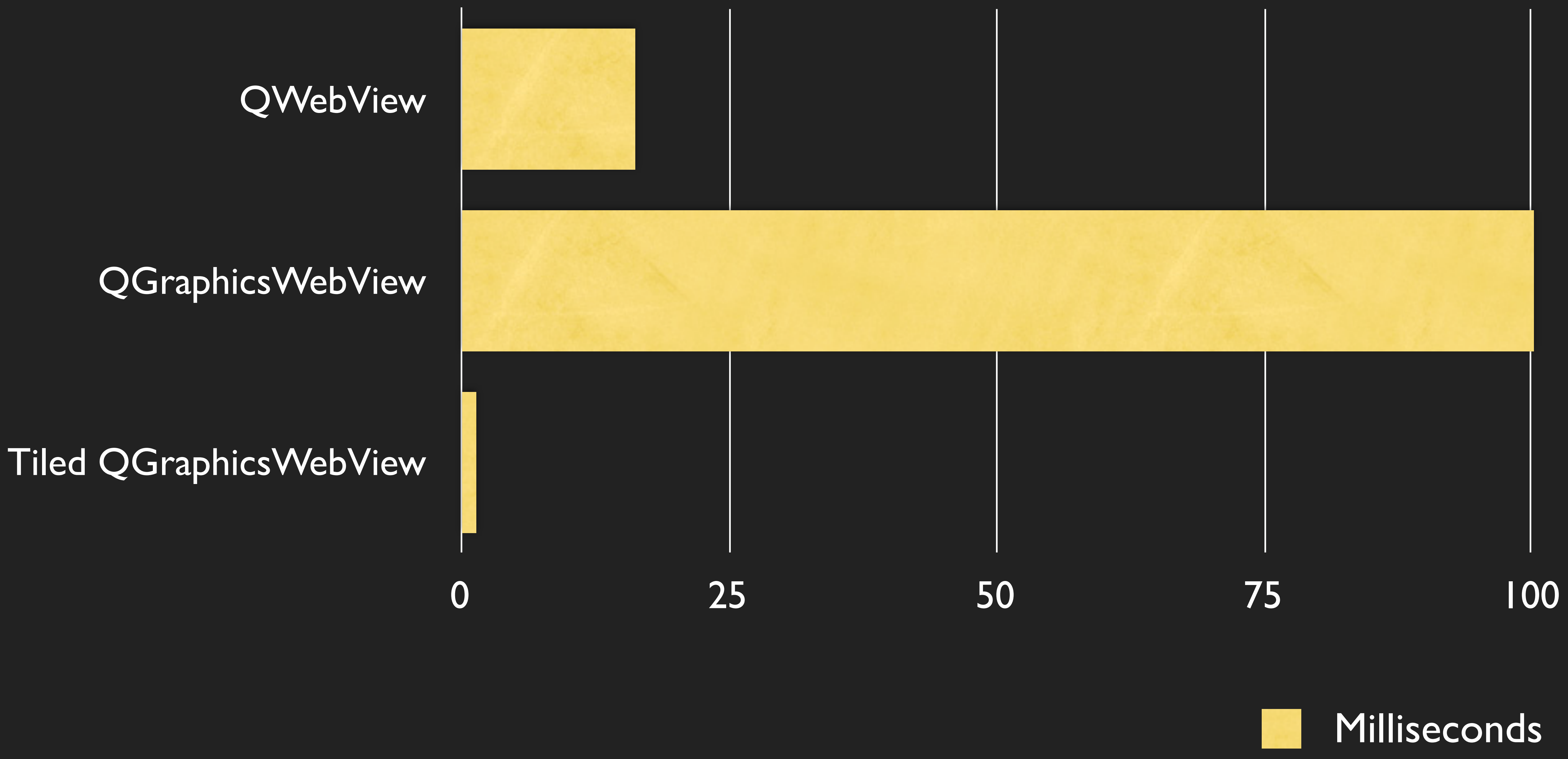
Slashdot page



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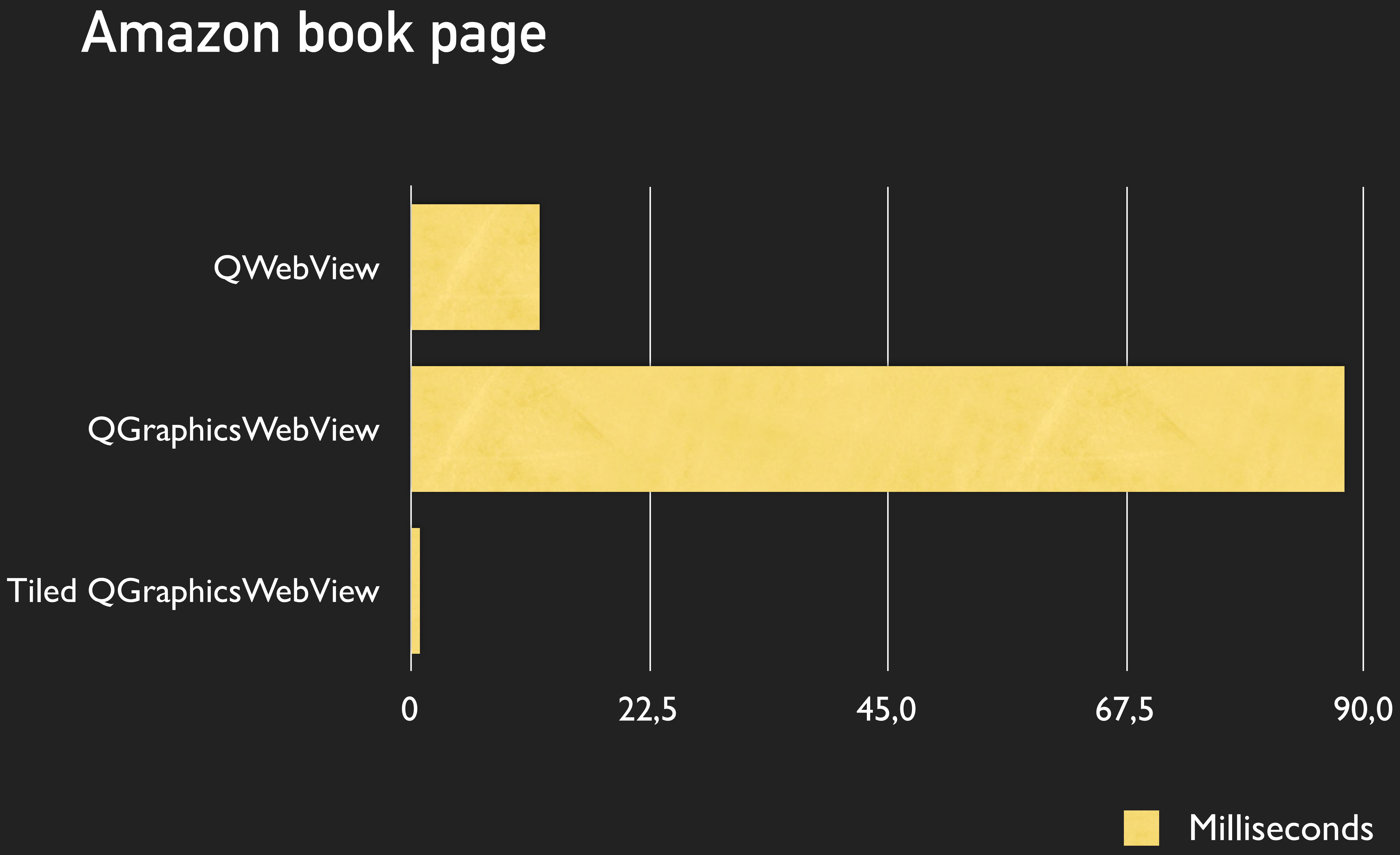

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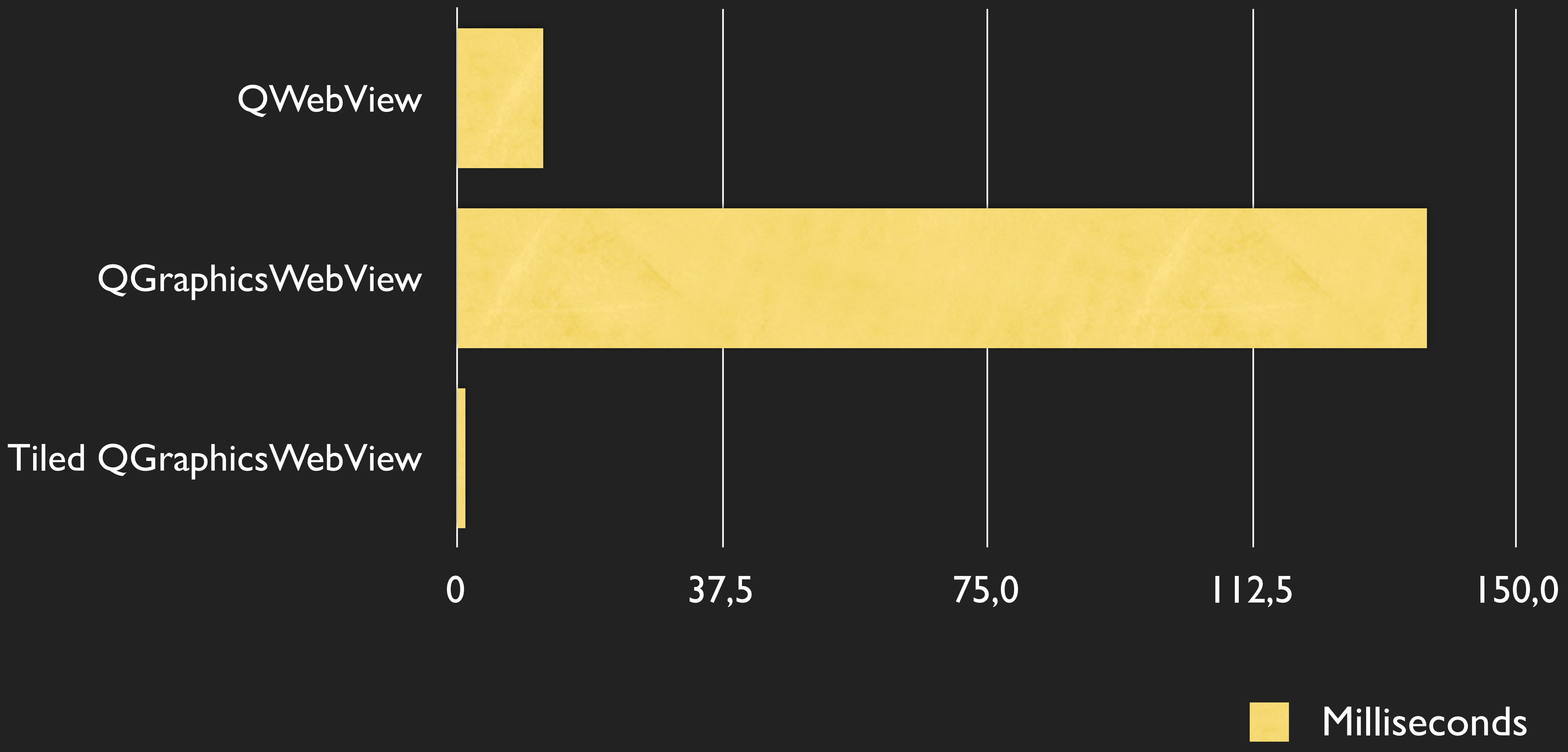
Wikipedia Qt page



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Ideas for improvement

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Paint in another thread, not block WebCore

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- More realistic test suite!
- My data structures are not that good, nor profiled
- Should be lower in the stack using WebCore constructs
- Paint in another thread, not block WebCore

That is why we are here ;-) Now let’s get on to the work!

Thanks for listening

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