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Subject: How would I virtualize a scrollable view to dynamically load Ctrls?

Posted by [jjacksonRIAB](#) on Thu, 19 May 2022 17:07:35 GMT

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Quick example:

```
#include <CtrlLib/CtrlLib.h>

using namespace Upp;

struct App : TopWindow {
    ScrollBar sb;
    Array<RichTextCtrl> items;

    int GetLineHeight() {
        return 25;
    }

    void Sync() {
        int startY = 10;
        Rect pr = GetRect();
        auto sz = GetSize();

        for(RichTextCtrl& item : items) {
            Rect r = item.GetRect();

            item.SetRect(r.left, startY - sb, pr.GetWidth(), item.GetHeight(sz.cx));
            startY += r.GetHeight() + 5;
        }

        sb.SetTotal(startY);
    }

    void Paint(Draw& w) override {
        Size sz = GetSize();
        w.DrawRect(sz, SWhite());
        Sync();
    }

    void Layout() override {
        sb.SetPage(GetSize().cy);
    }

    void MouseWheel(Point, int zdelta, dword) override {
        sb.Wheel(zdelta);
    }
}
```

```

bool Key(dword key, int) override {
    return sb.VertKey(key);
}

App() {
    Sizeable().Zoomable();

    for(int i = 0; i < 1000; i++) {
        RichTextCtrl& item = items.Create<RichTextCtrl>();

        item.SetData(
            Format(
                "[@(%d.%d.%d) Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do
eiusmod tempor incididunt ut labore et "
                "dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco
laboris nisi ut aliquip "
                "ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit
esse cillum dolore eu "
                "fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui
officia deserunt "
                "mollit anim id est laborum.]",
                (int)Random(255), (int)Random(255), (int)Random(255))
            );

        item.SetZoom(Zoom(1, 1));
        item.HSizePos(0, 0).VSizePos(0, 0);
        item.SetRect(0, 0, 0, item.GetHeight(250));
        item.IgnoreMouse();

        Add(item);
    }

    Sync();

    sb.Enable();
    sb.WhenScroll = [this] { Sync(); };
    sb.SetLine(GetLineHeight());
    AddFrame(sb);
}
};

GUI_APP_MAIN {
    App app;
    app.SetRect(0, 0, 250, 500);
    app.Run();
}

```

I don't know if there is any facility built into U++ for this already but I'd like to dynamically load and unload a bunch ofCtrls as I scroll (web equivalent a virtual scroller) so that I don't have a bunch of redraws ofCtrls that aren't visible in the view. As you can see from the example it can get quite expensive to resize the window if it has thousands of controls.

How would I accomplish this?

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Subject: Re: How would I virtualize a scrollable view to dynamically loadCtrls?

Posted by [mirek](#) on Tue, 31 May 2022 09:13:10 GMT

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Placing those text in Paint is not a good idea. The time is spent in RichTextCtrl::GetHeight, which is slow. I have tried to optimise

```
#include <CtrlLib/CtrlLib.h>

using namespace Upp;

struct App : TopWindow {
    ScrollBar sb;
    Array<RichTextCtrl> items;

    int GetLineHeight() {
        return 25;
    }

    void Scroll() {
        Size sz = GetSize();
        int sy = sb;
        int y = 0;
        for(RichTextCtrl& item : items) {
            int h = item.GetRect().GetHeight();
            if(sz.cx && y + h > sy && y < sy + sz.cy) {
                item.Show();
                item.SetRect(0, y - sy, sz.cx, h);
            }
            else
                item.Hide();
            y += h + 5;
        }
    }

    void Paint(Draw& w) override {
        Size sz = GetSize();
        w.DrawRect(sz, SWhite());
    }
}
```

```

void Layout() override {
    Size sz = GetSize();
    sb.SetPage(sz.cy);

    if(sz.cx) {
        int y = 0;
        for(RichTextCtrl& item : items) { // compute the height - that can be slow
            Rect r = item.GetRect();
            if(r.GetWidth() != sz.cx) {
                int h = item.GetHeight(sz.cx);
                item.SetRect(0, 0, sz.cx, h);
                item.Hide();
                y += h + 5;
            }
        }
        sb.SetTotal(y);
    }

    Scroll();
}

void MouseWheel(Point, int zdelta, dword) override {
    sb.Wheel(zdelta);
}

bool Key(dword key, int) override {
    return sb.VertKey(key);
}

App() {
    Sizeable().Zoomable();

    for(int i = 0; i < 10000; i++) {
        RichTextCtrl& item = items.Create<RichTextCtrl>();

        item.SetData(
            Format(
                "[@(%d.%d.%d) Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod
tempor incididunt ut labore et "
                "dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi
ut aliquip "
                "ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum
dolore eu "
                "fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia
deserunt "
                "mollit anim id est laborum.]",
                (int)Random(255), (int)Random(255), (int)Random(255))

```

```

);

item.SetZoom(Zoom(1, 1));
item.SetRect(0, 0, 0, 0);
item.IgnoreMouse();

Add(item);
}

sb.Enable();
sb.WhenScroll = [this] { Scroll(); };
sb.SetLine(GetLineHeight());
AddFrame(sb);
}
};

GUI_APP_MAIN {
App app;
app.SetRect(0, 0, 250, 500);
app.Run();
}

```

Which works fine for 10000 texts; with 100000 texts it is slow again, but the time once again is lost in GetHeight - that one basically needs to typeset that paragraph with all typographic rules. I can try to look into it, OTOH as we will need to support advanced composition in future, chances are it will only get slower then.

Mirek

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Subject: Re: How would I virtualize a scrollable view to dynamically load Ctrls?

Posted by [jjacksonRIAB](#) on Tue, 31 May 2022 10:41:58 GMT

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mirek wrote on Tue, 31 May 2022 11:13 Placing those text in Paint is not a good idea. The time is spent in RichTextCtrl::GetHeight, which is slow. I have tried to optimise

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Which works fine for 10000 texts; with 100000 texts it is slow again, but the time once again is lost in GetHeight - that one basically needs to typeset that paragraph with all typographic rules. I can try to look into it, OTOH as we will need to support advanced composition in future, chances are it will only get slower then.

Mirek

Thanks for giving it a shot, Mirek. Unfortunately with even 10,000 ctrls on my older machine either application is so slow during a window resize that I can't even tell which one is faster by looking at it. I'll have to see if it's a problem with my compositor.

If the rich ctrl will allow me to do more in the future that sounds like a good thing. Maybe it means I could stop using thousands of them and instead just use one. Until then it looks like I'll have to come up with some form of dynamic loading.

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Subject: Re: How would I virtualize a scrollable view to dynamically load Ctrls?  
Posted by [mirek](#) on Tue, 31 May 2022 12:39:05 GMT

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I am afraid that with thousands of paragraphs, it will still be slow determining the height for given with (e.g. RichTextCtrl needs to do that in Layout anyway). Note that if you load some really big text in MS Word or OpenOffice writer, it can be slow as well before he reformats everything. In you current example, you need to typeset about 4 millions glyphs... :)

It is strange it is slow on your machine though. What exactly is slow, scrolling?

Mirek

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Subject: Re: How would I virtualize a scrollable view to dynamically load Ctrls?  
Posted by [jjacksonRIAB](#) on Tue, 31 May 2022 19:27:11 GMT

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mirek wrote on Tue, 31 May 2022 14:39I am afraid that with thousands of paragraphs, it will still be slow determining the height for given with (e.g. RichTextCtrl needs to do that in Layout anyway). Note that if you load some really big text in MS Word or OpenOffice writer, it can be slow as well before he reformats everything. In you current example, you need to typeset about 4 millions glyphs... :)

It is strange it is slow on your machine though. What exactly is slow, scrolling?

Mirek

Scrolling is fine. Resizing just kills it. This is on linux though, I don't know if you were running it on Windows. KDE, cinnamon, lxde - doesn't matter on any DE I've tested even with compositing turned off.

But yeah, given the amount it has to do to the text I'm not surprised it bogs down. That's a lot of work to do just for a transitional effect. I thought the problem, other than the sheer number of items was in GetHeight too, promise to use the profiler code in the future to know for sure. One thing I was really impressed with was how little memory it used.

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Subject: Re: How would I virtualize a scrollable view to dynamically loadCtrls?

Posted by [mirek](#) on Wed, 01 Jun 2022 13:34:17 GMT

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jjacksonRIAB wrote on Tue, 31 May 2022 21:27mirek wrote on Tue, 31 May 2022 14:39I am afraid that with thousands of paragraphs, it will still be slow determining the height for given with (e.g. RichTextCtrl needs to do that in Layout anyway). Note that if you load some really big text in MS Word or OpenOffice writer, it can be slow as well before he reformats everything. In you current example, you need to typeset about 4 millions glyphs... :)

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That part is actually not influenced by DE nor system in any way... I believe 99% of time is spent in

RichPara::Lines RichPara::FormatLines(int acx) const

RichText/ParaType.cpp:237

Mirek

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Subject: Re: How would I virtualize a scrollable view to dynamically loadCtrls?

Posted by [jjacksonRIAB](#) on Wed, 01 Jun 2022 13:57:42 GMT

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mirek wrote on Wed, 01 June 2022 15:34jjacksonRIAB wrote on Tue, 31 May 2022 21:27mirek wrote on Tue, 31 May 2022 14:39I am afraid that with thousands of paragraphs, it will still be slow determining the height for given with (e.g. RichTextCtrl needs to do that in Layout anyway). Note that if you load some really big text in MS Word or OpenOffice writer, it can be slow as well before he reformats everything. In you current example, you need to typeset about 4 millions glyphs... :)

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```
RichPara::Lines RichPara::FormatLines(int acx) const
```

```
RichText/ParaType.cpp:237
```

Mirek

Having not tested it myself I'll defer to your experience but my rationale for how it could happen is that perhaps one DE/WM may fire resize events more frequently than another but it was just a guess. More likely your machine is just significantly faster than mine. :d

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