Window Updates

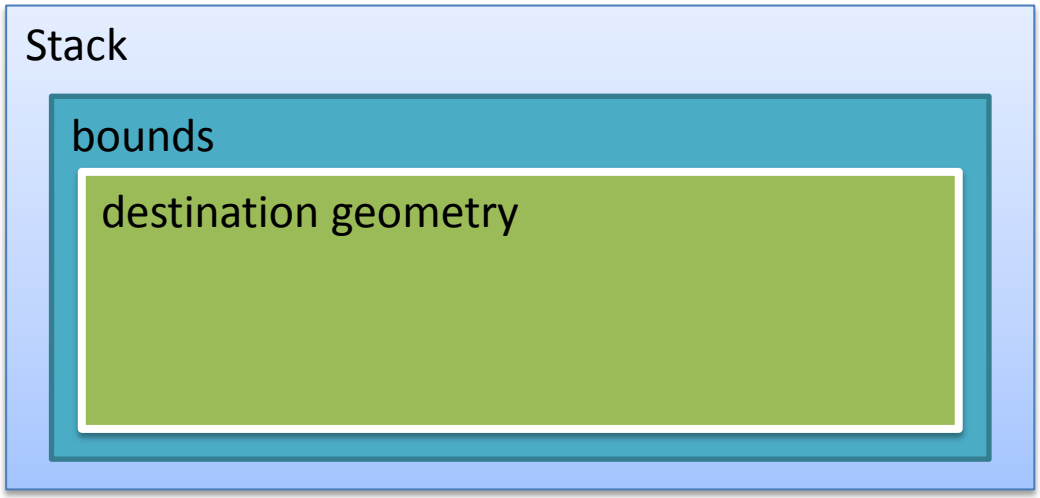
Introduction to composition and presentation of the window stack

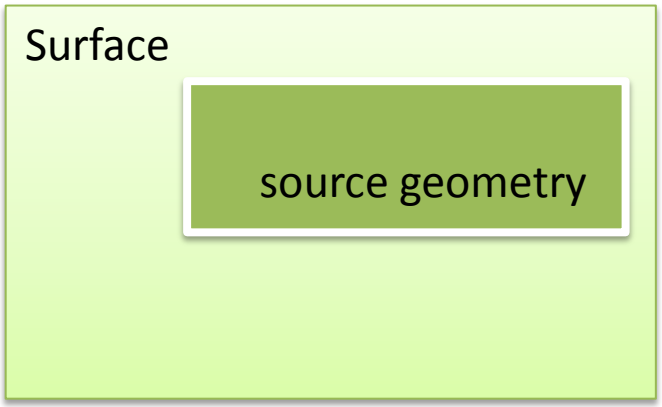
Terminology

Term	Description
Surface	Contains one or more pixel buffers
Window	Element on screen which can be a portion of a surface or a static color
Window Stack	List of windows and background color or image
Display Layer	Hardware entity showing the surface of the composited stack, e.g. an OSD plane
Swapping	One buffer is queued for display on the layer, list of buffers is rotated by one

Windows

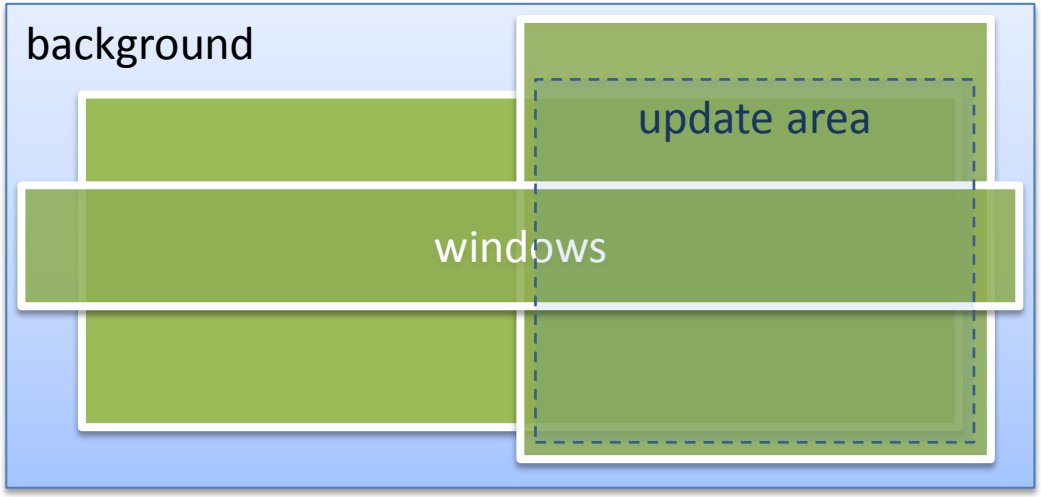
Property	Description
bounds	Rectangular output area, basis for calculation of destination geometry, borders, scaling…
source geometry	Portion of the window surface to be shown on screen
destination geometry	Portion of the window bounds used to show the window surface





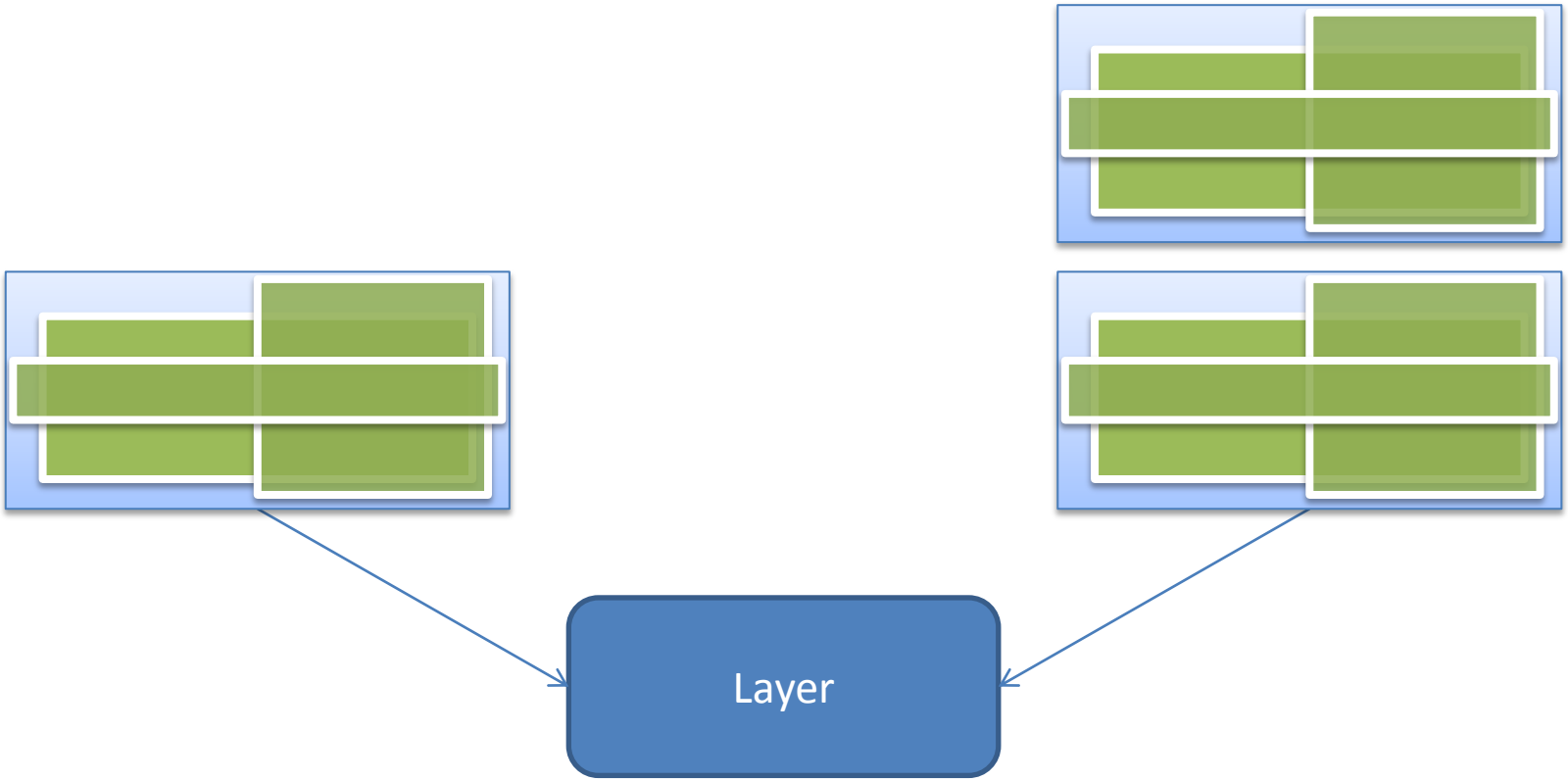
Composition

- The stack of windows is rendered onto a surface for presentation on a display layer
- Updates are often clipped to an area



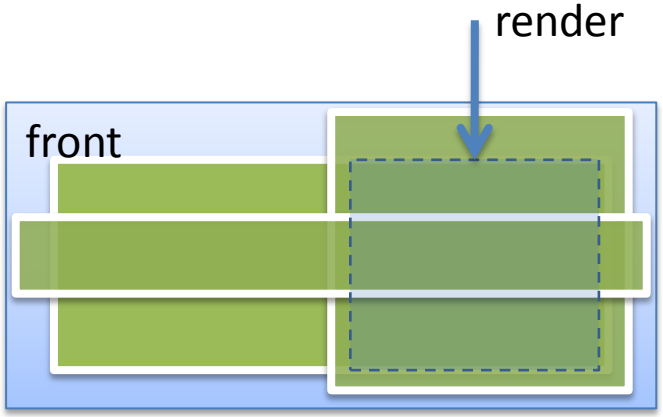
Presentation

- Single, double or triple buffered stack surface
- All buffers kept up to date



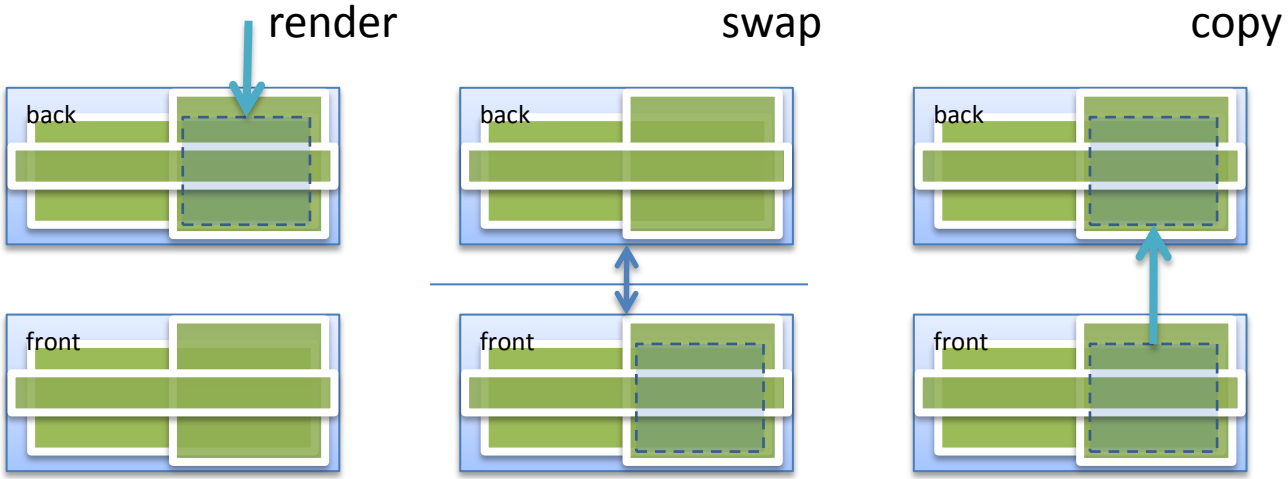
Single buffered

- Only front buffer available
- Visible on screen
- Rendered into by composition



Double buffered

- Additional back buffer available
- Render into back buffer
- Swap front and back buffers (waiting for sync)
- Copy updated area from front to back buffer

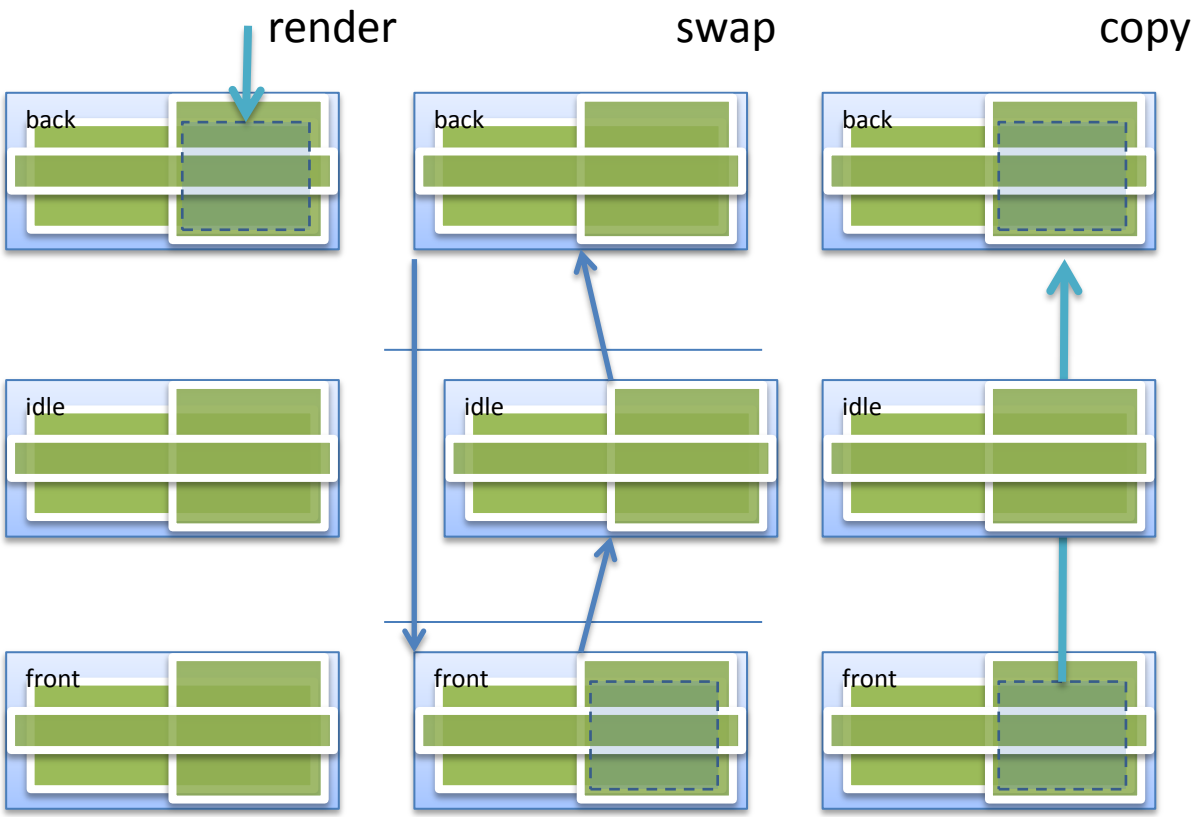


Triple buffered

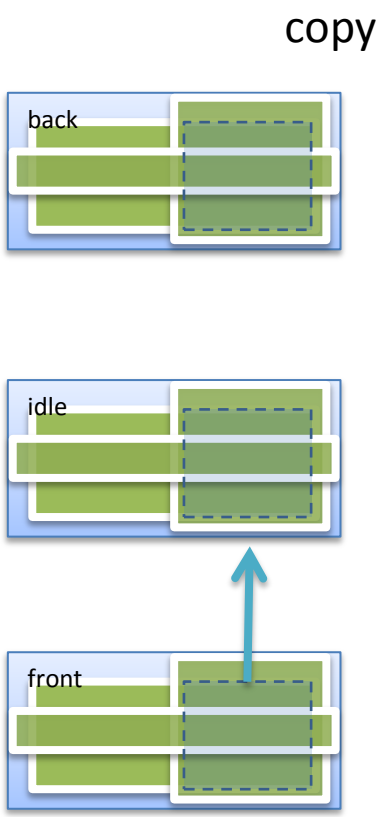
- Asynchronous swap, callback on presentation
- Render into back buffer, if no previous swap pending swap buffers and copy from front to back buffer
- On presentation copy from front to idle buffer (previous front buffer), if back buffer was rendered into swap and copy as usual followed by another presentation callback

Triple buffered

- Render (no swap pending)

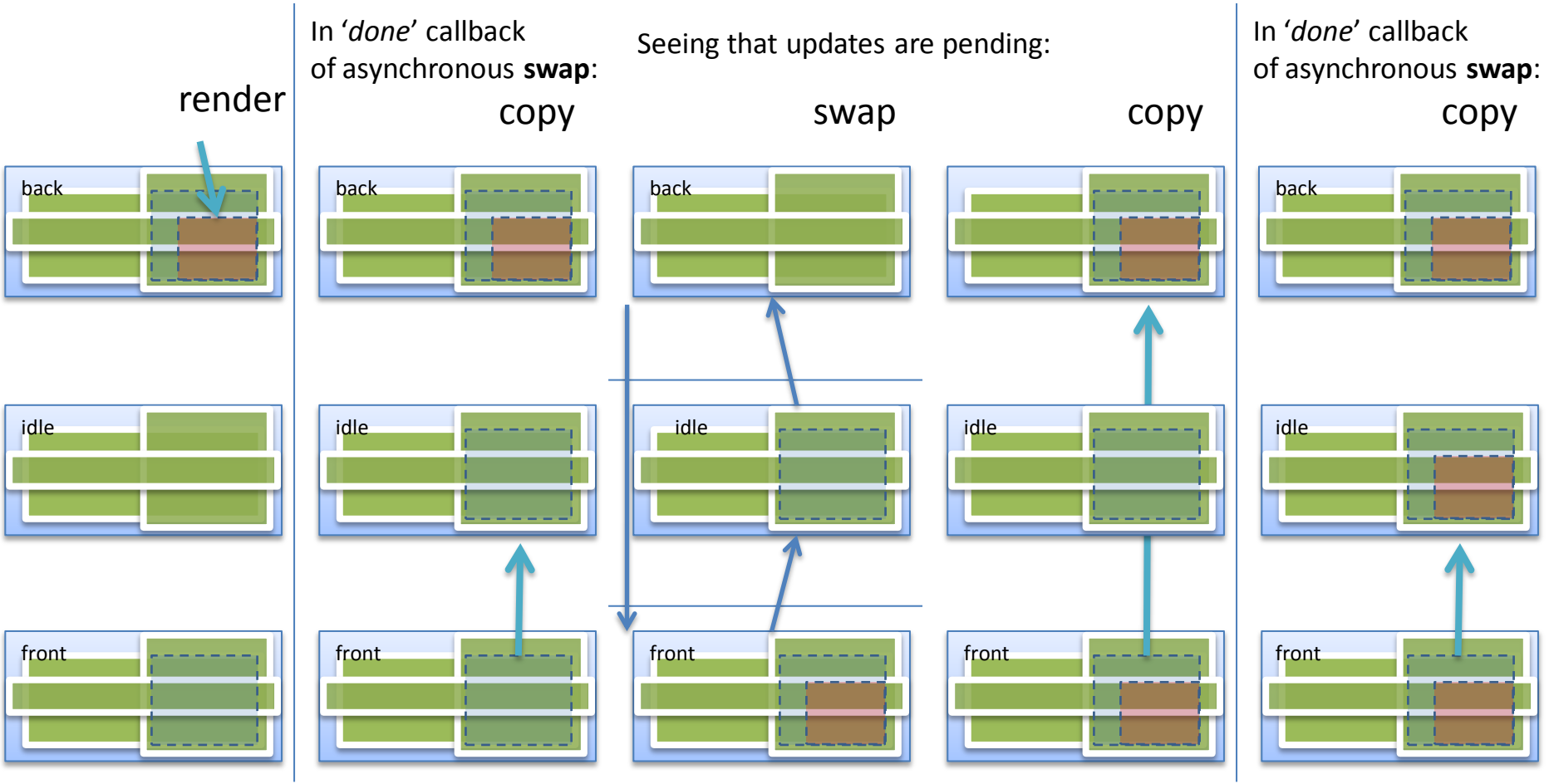


In '*done*' callback
of asynchronous **swap**:



Triple buffered

- Render (swap pending)



Triple buffered