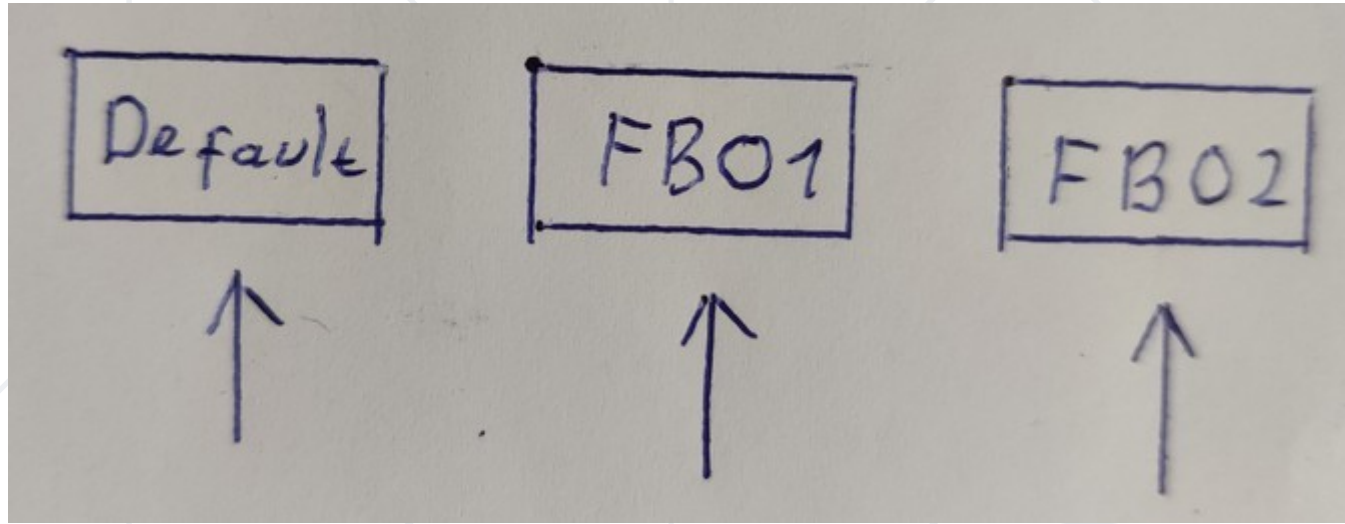
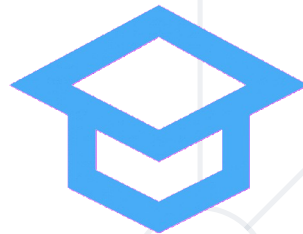


Draw Optimizations



Zhivko Petrov

A guy that knows C++



SoftUni



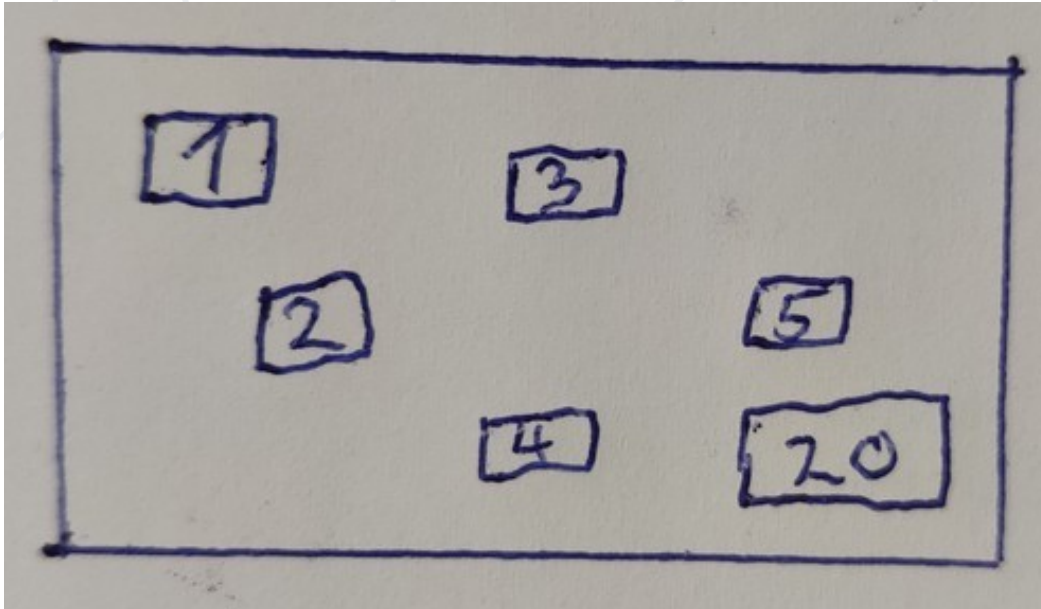
Software University

<https://about.softuni.bg>

sli.do

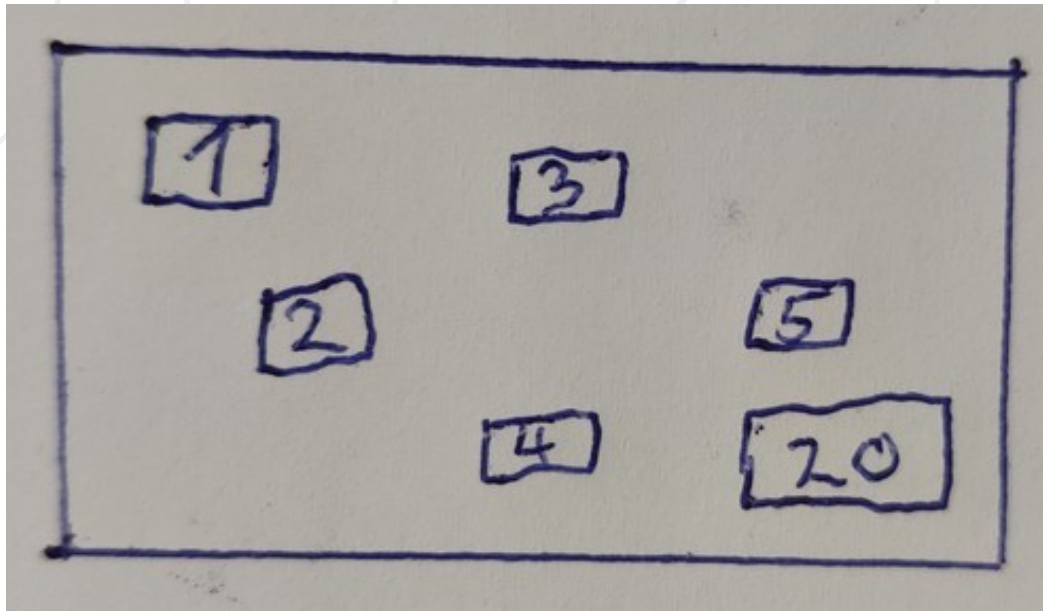
#app-dev-cpp

- Imagine the scenario where there is a semi-static background with 20 assets on it
- Every 5 seconds those assets are moved
- This 5 second windows translates to
- $20 \text{ assets} \times 60 \text{ FPS} \times 5 \text{ seconds} = \mathbf{6000 \text{ draw calls}}$

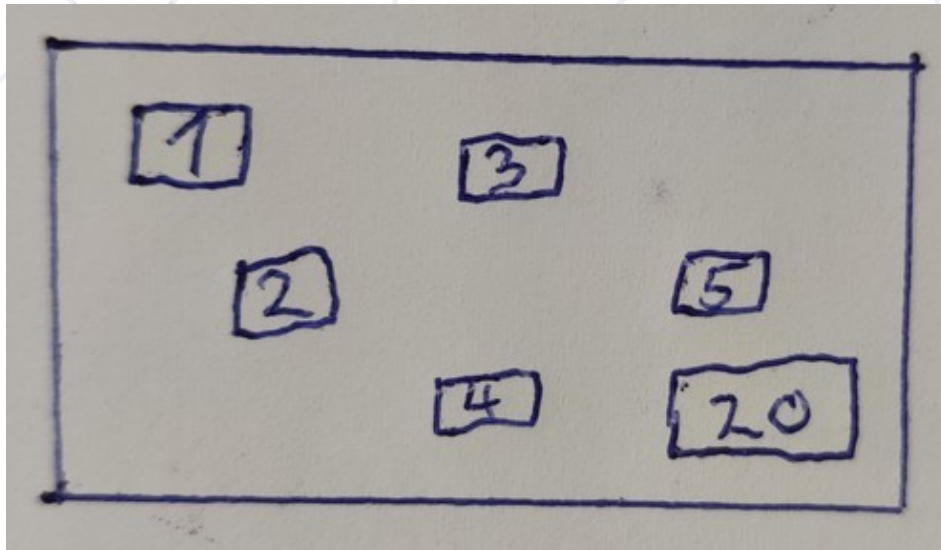


Draw calls - ouch

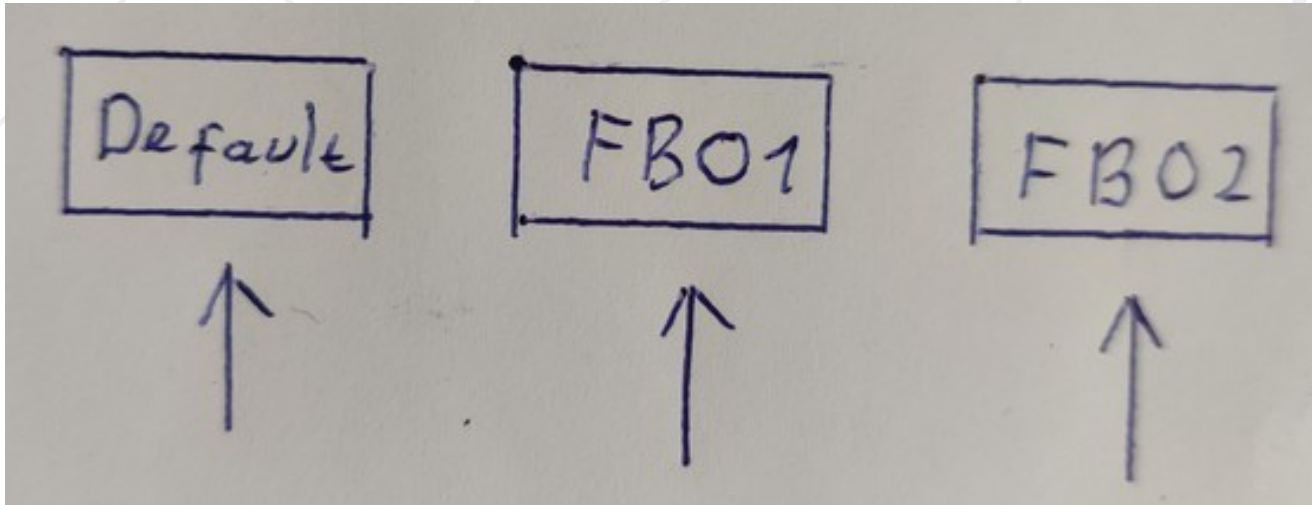
- That's **a lot** of draw calls!
- But fear not – we can use the good old **cache optimization** here
- This time in the **graphical context**!
- But how is this achieved?



- Instead of drawing the 20 assets every single frame
- Create a **run-time new asset**
- Draw those 20 assets onto the new widget
- For the next 5 seconds draw only **that widget**
- 1 Assets x 60 FPS x 5 seconds = **300 draw calls**

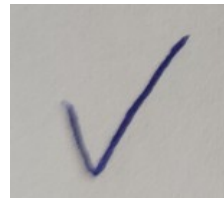
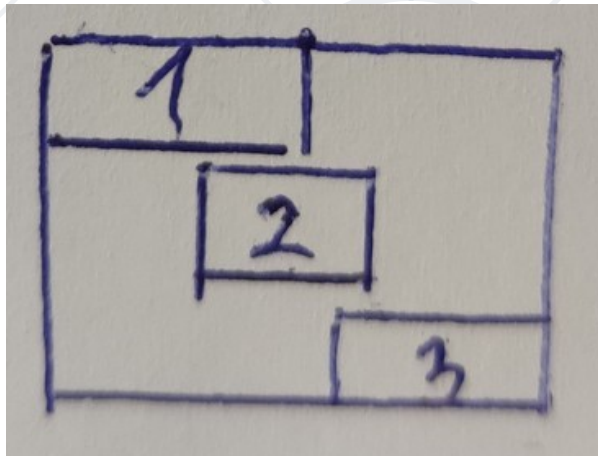
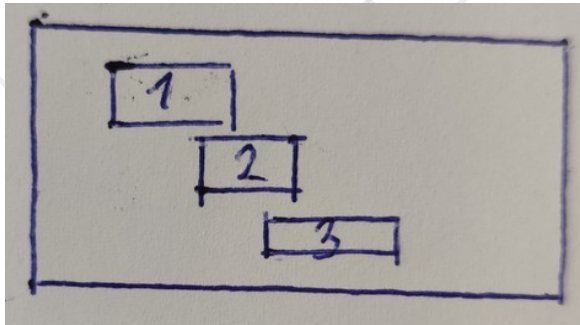


- This technique is also known as **Frame Buffer Object (FBO)**
- Where different frames are stored into the a Buffer Object
- We need to **change the renderer target** for each FBO
- By default it is pointing at the back buffer
- After an update to the FBO **don't forget to reset** it back to the default back buffer



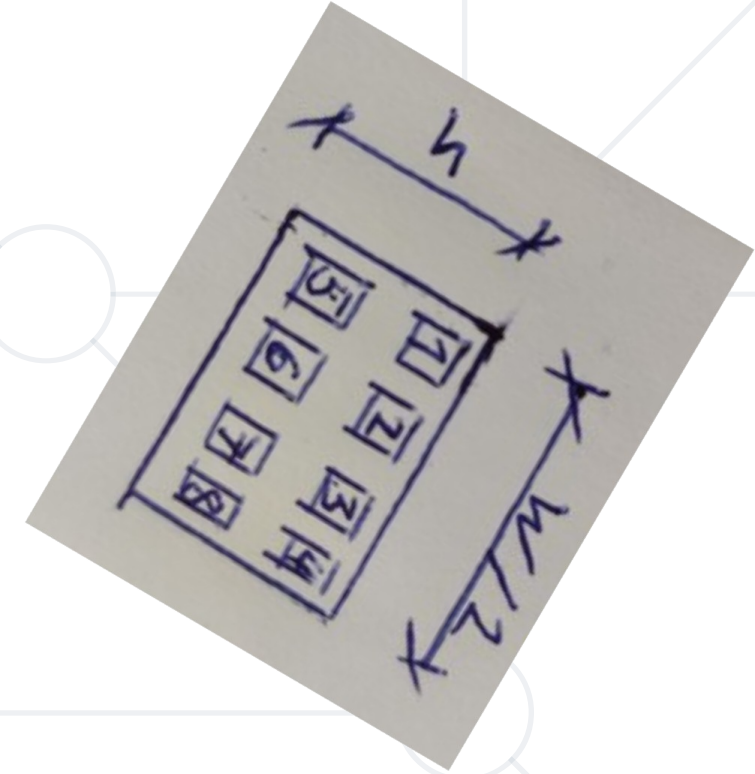
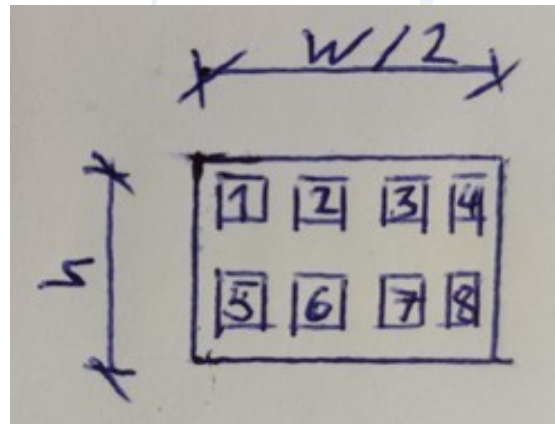
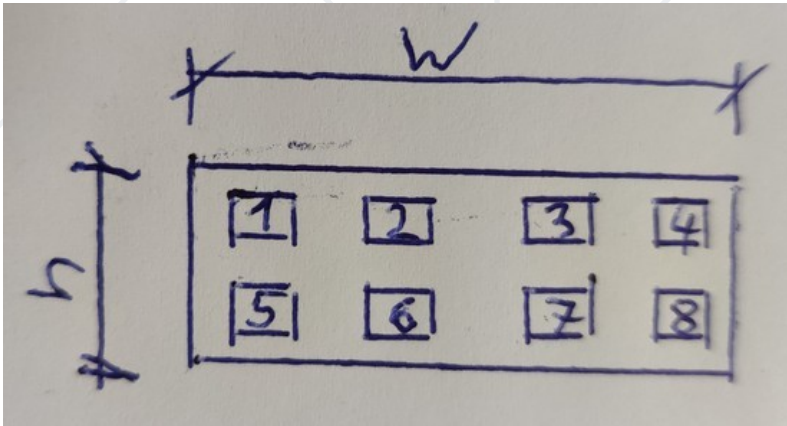
- FBO must be **cleared/updated on each change**
- Could be **slow** if used improperly
- **Additional work & complexity** for the developer
- **Additional memory** required
- With **great power** – comes **great responsibility**

- An FBO must have **enough space** to account for all of it's widgets
- This could lead to much **wasted space** (resources)
- Use the **smallest possible bounding box**

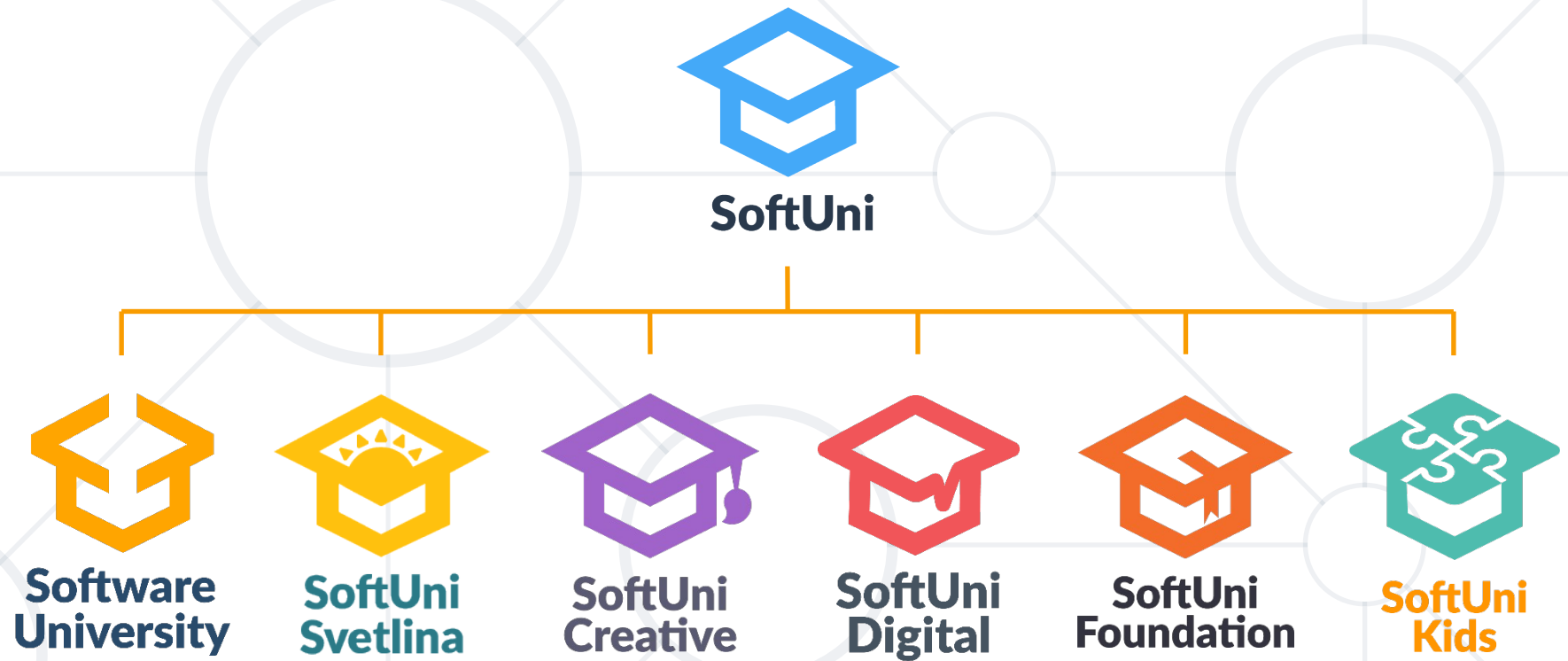


FBO Tips & Tricks

- An FBO is not only used for **performance**
- It is also used to achieve **fancy animations**
- Imagine this button panel
- It could be shrunk
- Or shrunk and rotated



Questions?



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