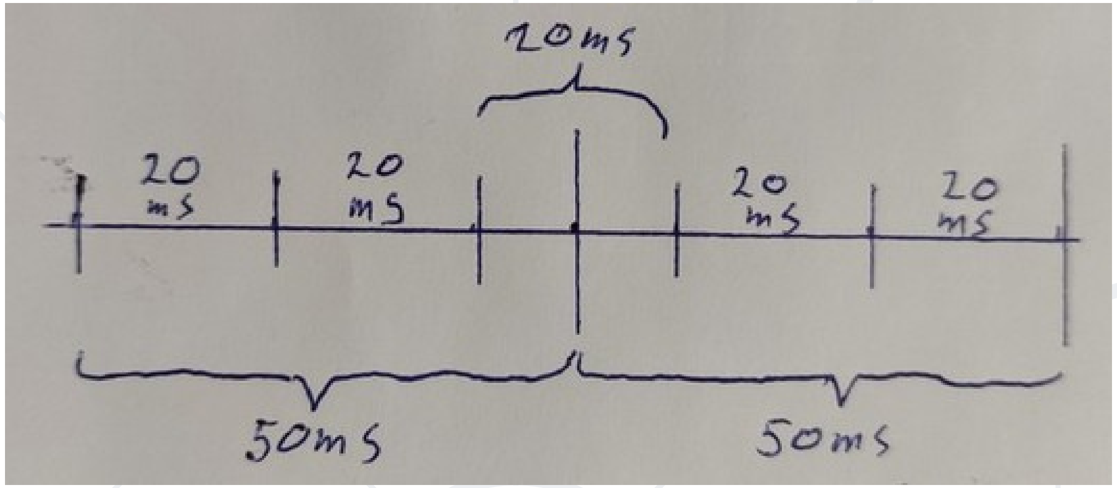
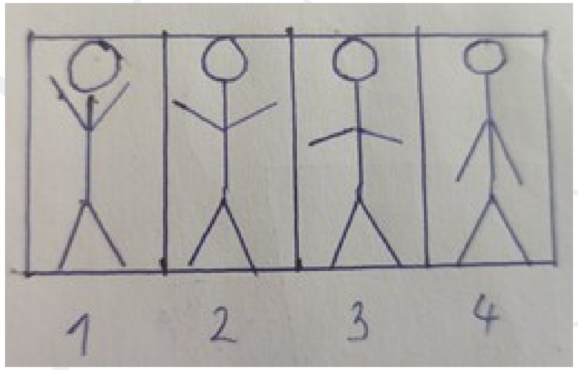
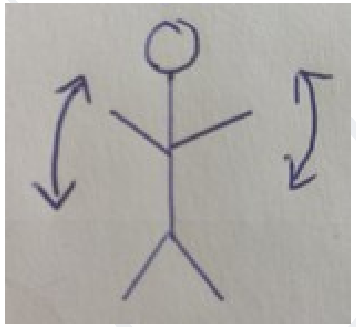
Timers







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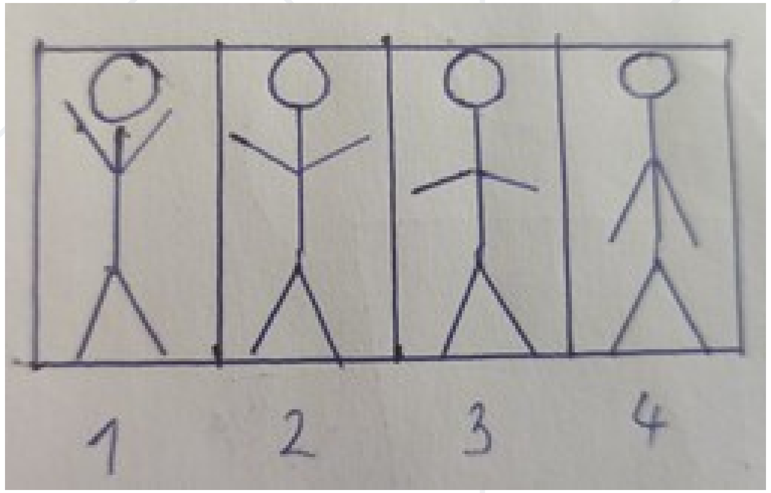
Have a Question?

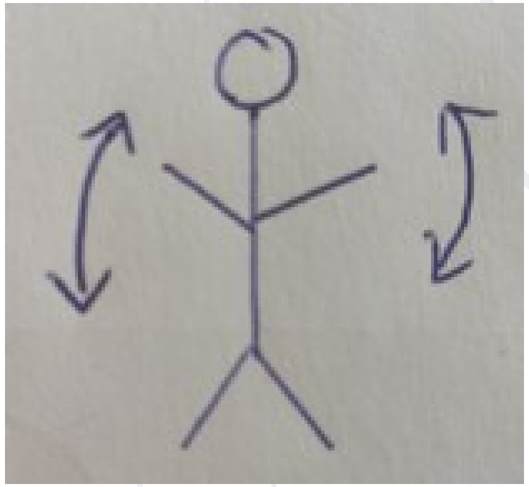
sli.do

#app-dev-cpp

Animations

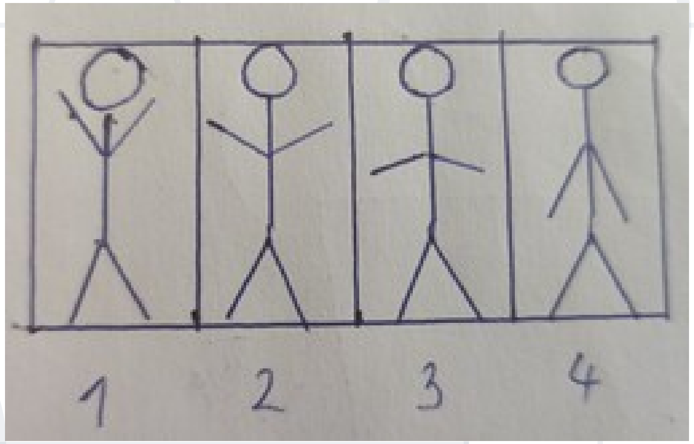
- Imagine you want to implement an animation
- But you **can't constantly click** on the keyboard to move the sprites
- You need some kind of mechanism in order to **simulate the event in time**
- But how can this be achieved?

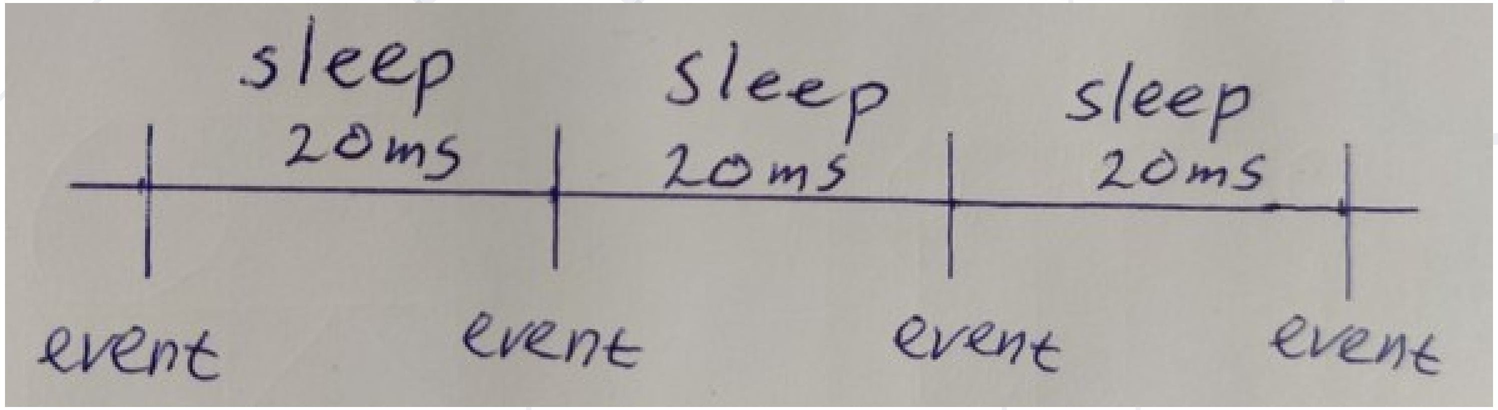




Timers

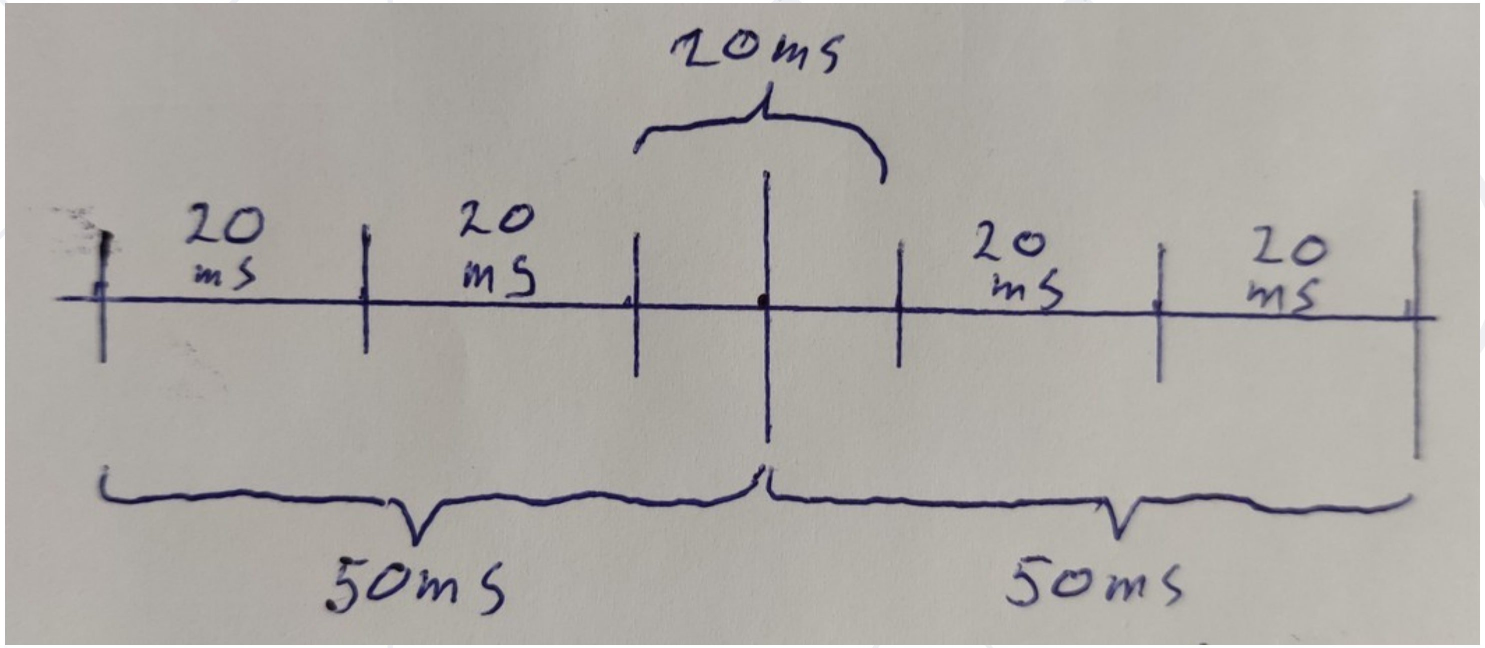
- **Timers** to the rescue!
- They implement a **mechanism for waiting** in time and the executing some **predefined event**
- Let’s say every 20ms we want to change the sprite of our animation
- Sprite changes, sleep 20ms,
  sprite changes, sleep 20ms, etc…





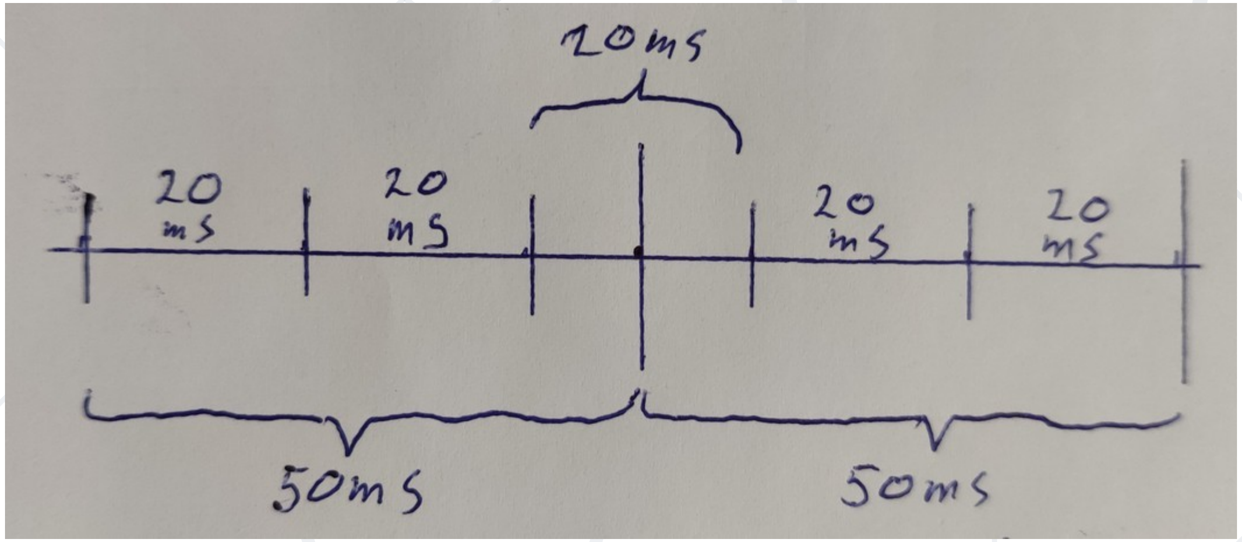
More animations

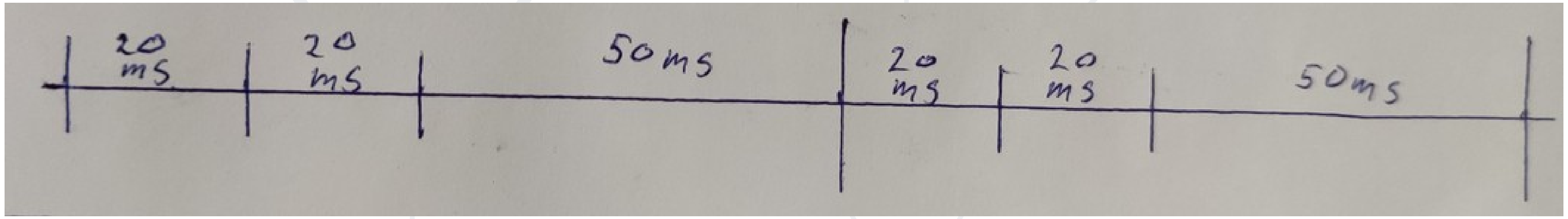
- Let’s make things more interesting
- We want to implement **another animation** – this time on a 50ms interval
- The first one should “tick” on each 20ms, the second on each 50ms



Delay

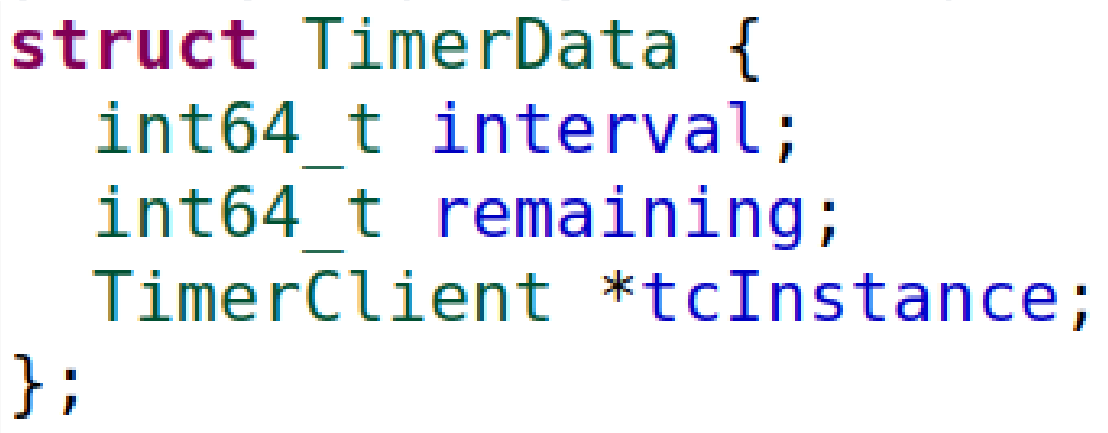
- We are aiming for this:
- But instead we get this:
- Animations (and the whole program) starts getting **laggy**





Understanding the problem

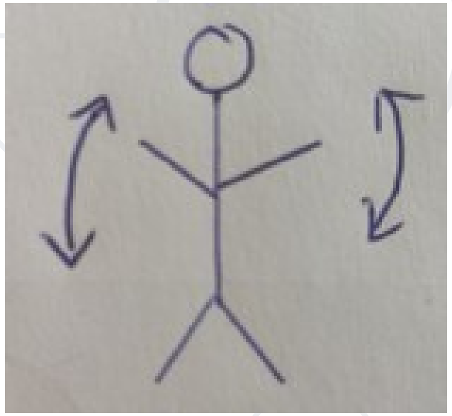
- You **must not "sleep"** your program/main thread
- Instead of sleeping a **"waiting" mechanism** should be implemented
- **Interval** – how often should the timer tick
- **Remaining** – time left to next tick
- **TcInstance** - The object, which should be invoked on timer tick

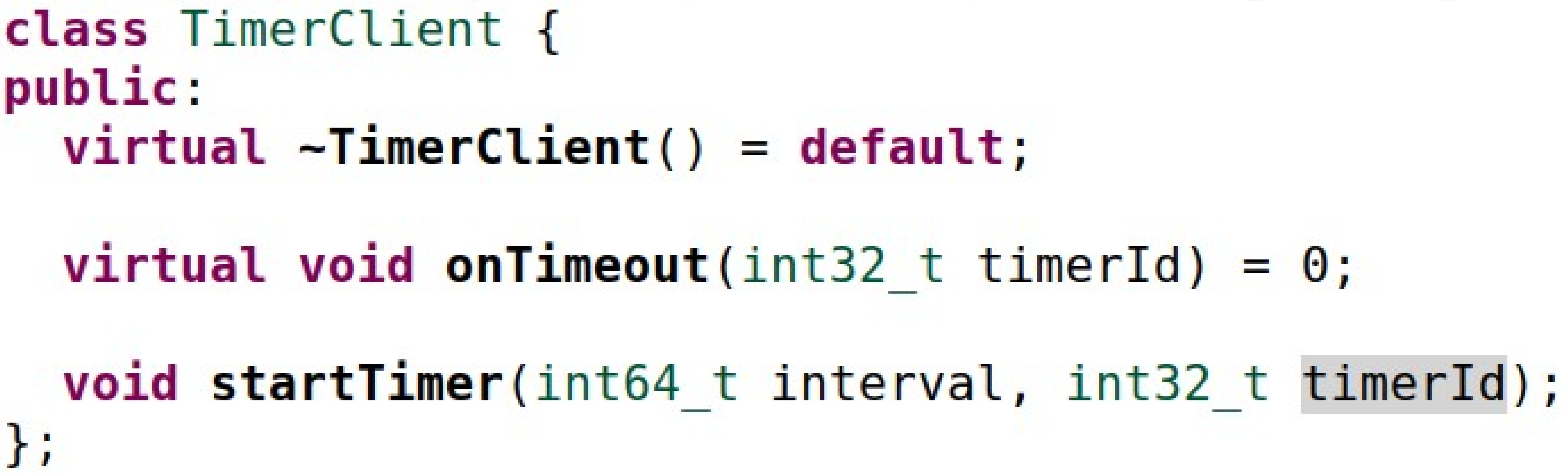


```
struct TimerData {
  int64_t interval;
  int64_t remaining;
  TimerClient *tcInstance;
};
```

Implementation basics

- A TimerClient class is implemented
- It is important to actually implement **a function callback**
- It determines what should be done when the time ticks (and who calls it)
- Change the animation frame for example





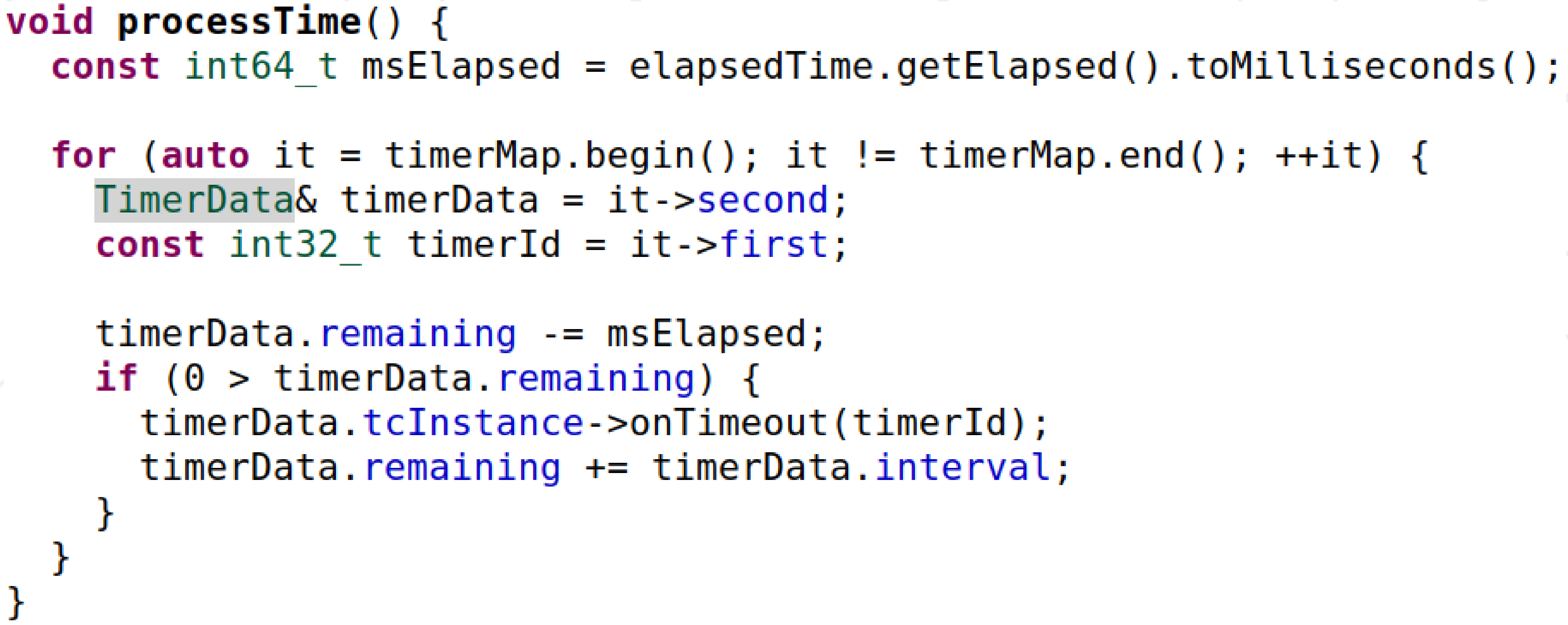
```
class TimerClient {
public:
  virtual ~TimerClient() = default;

  virtual void onTimeout(int32_t timerId) = 0;

  void startTimer(int64_t interval, int32_t timerId);
};
```

Keeping track of global time

- Somewhere at main loop level the concept of **global time** must be measured
- That time is used to **update all started timers**
- This **ensures same behavior** under different FPS



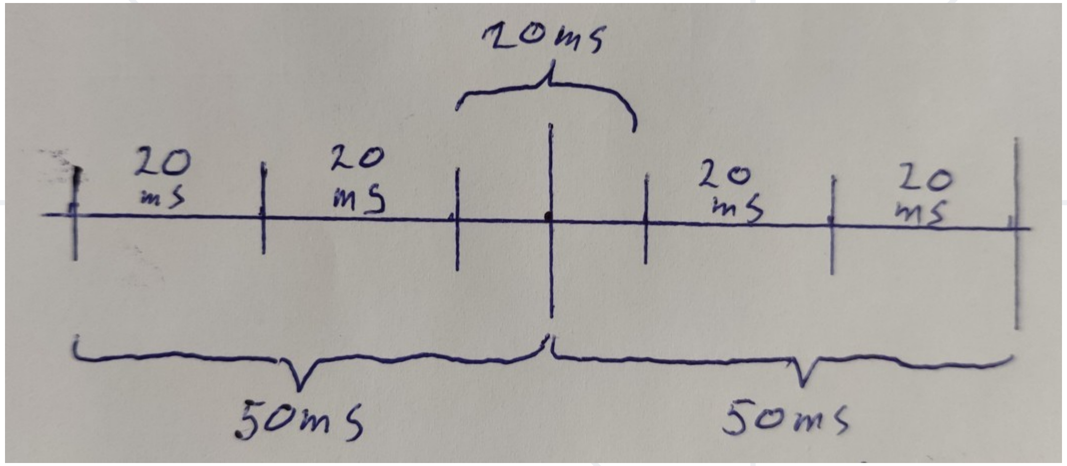
```
void processTime() {
  const int64_t msElapsed = elapsedTime.getElapsed().toMilliseconds();

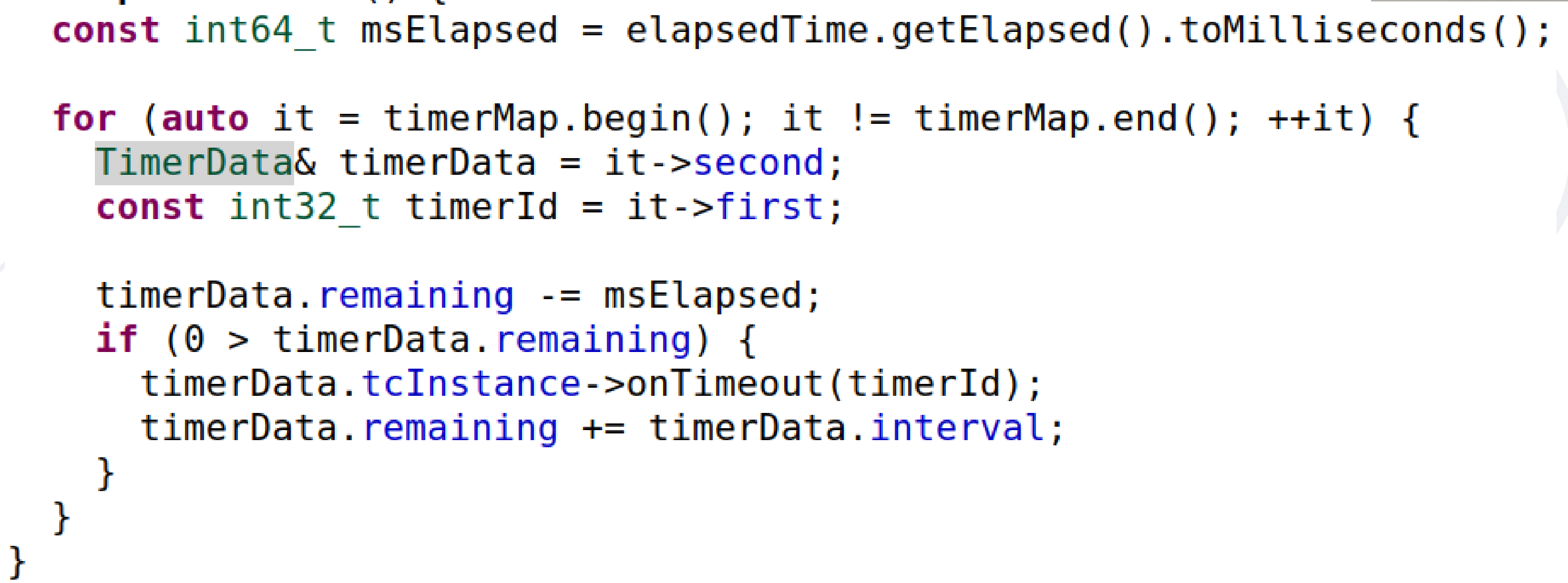
  for (auto it = timerMap.begin(); it != timerMap.end(); ++it) {
    TimerData& timerData = it->second;
    const int32_t timerId = it->first;

    timerData.remaining -= msElapsed;
    if (0 > timerData.remaining) {
      timerData.tcInstance->onTimeout(timerId);
      timerData.remaining += timerData.interval;
    }
  }
}
```

Problem - solved

- We’ve managed to achieve the wanted behavior
- Each timer is not blocking the program
- Each timer is independent





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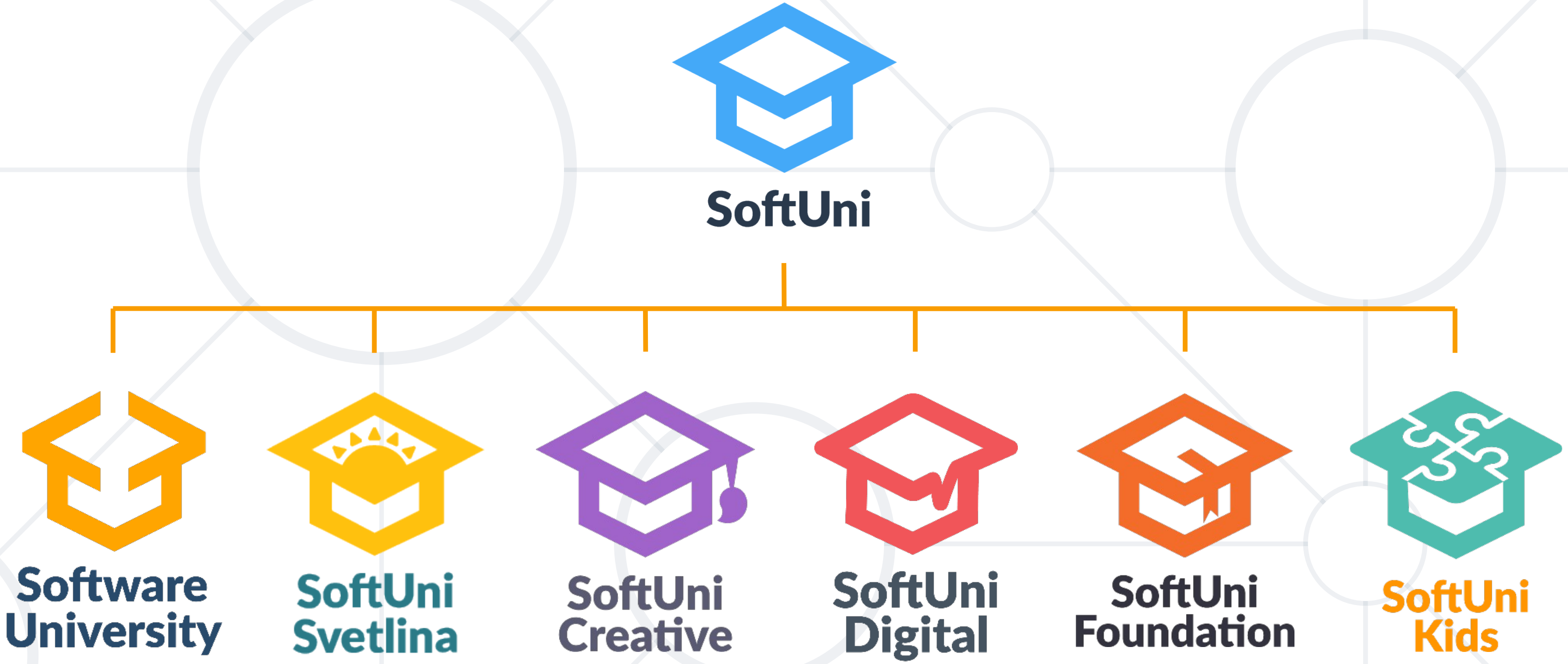
```

Questions?



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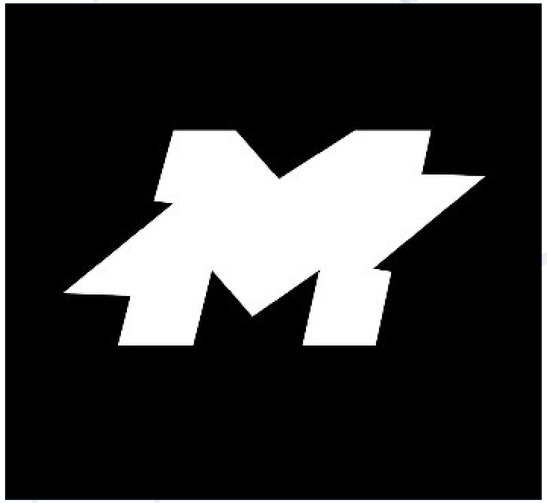

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