

# The Brain Behind the Lens

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CSC 240: Operating Systems

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# The Problem

## Visual/On-Screen Text:

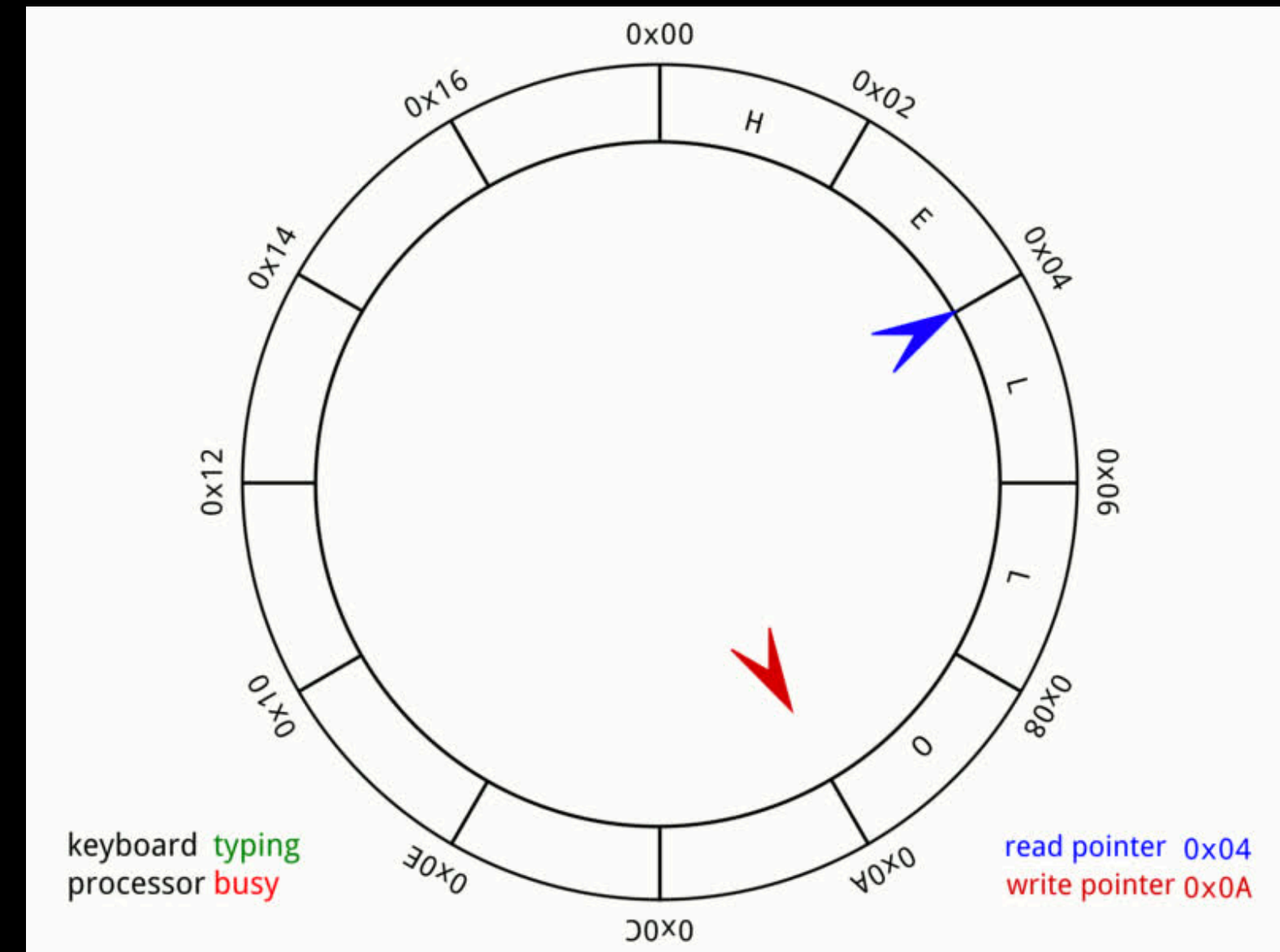
- The Hardware Bottleneck
- Sensor Output: 24 Megapixels @ 11 Frames Per Second (FPS)
- Data Generated: ~264 MB/s
- SD Card Max Write Speed: ~90 MB/s
- The Problem:  $264 \text{ MB/s} > 90 \text{ MB/s}$

while shooting in continuous burst mode. However, the writing speed of a typical SD card is limited to around 90 megabytes per second. Nearly three times as much data is produced by the camera than can be stored on the card. How does the system avoid dropping frames or crashing completely if the hardware is unable to keep up?



# Memory Management & The Ring Buffer

- To handle the massive speed difference between the sensor and the SD card, the OS uses a classic Producer-Consumer model for memory management.
- The camera has a dedicated block of high-speed RAM acting as a ring buffer. The sensor acts as the producer, dumping data into this buffer instantly.
- Meanwhile, the OS manages a background thread where the SD card the consumer slowly writes that data to permanent storage.



# Conclusion

- To wrap up, operating systems are the invisible engines powering our everyday devices.
- Because of them, our tech can capture fast moments seamlessly.





# Thank You

I'd be happy to answer any questions.

