

Implications of Computer Organization

Lecture 16

March 9th 2023 | COMP 211-002 | Joshua Bakita

Welcome!

Today:

- More on the software implications of physical computer structure

Logistics:

- Assignment 4 part 1 posted. Part 2 coming in the next week.

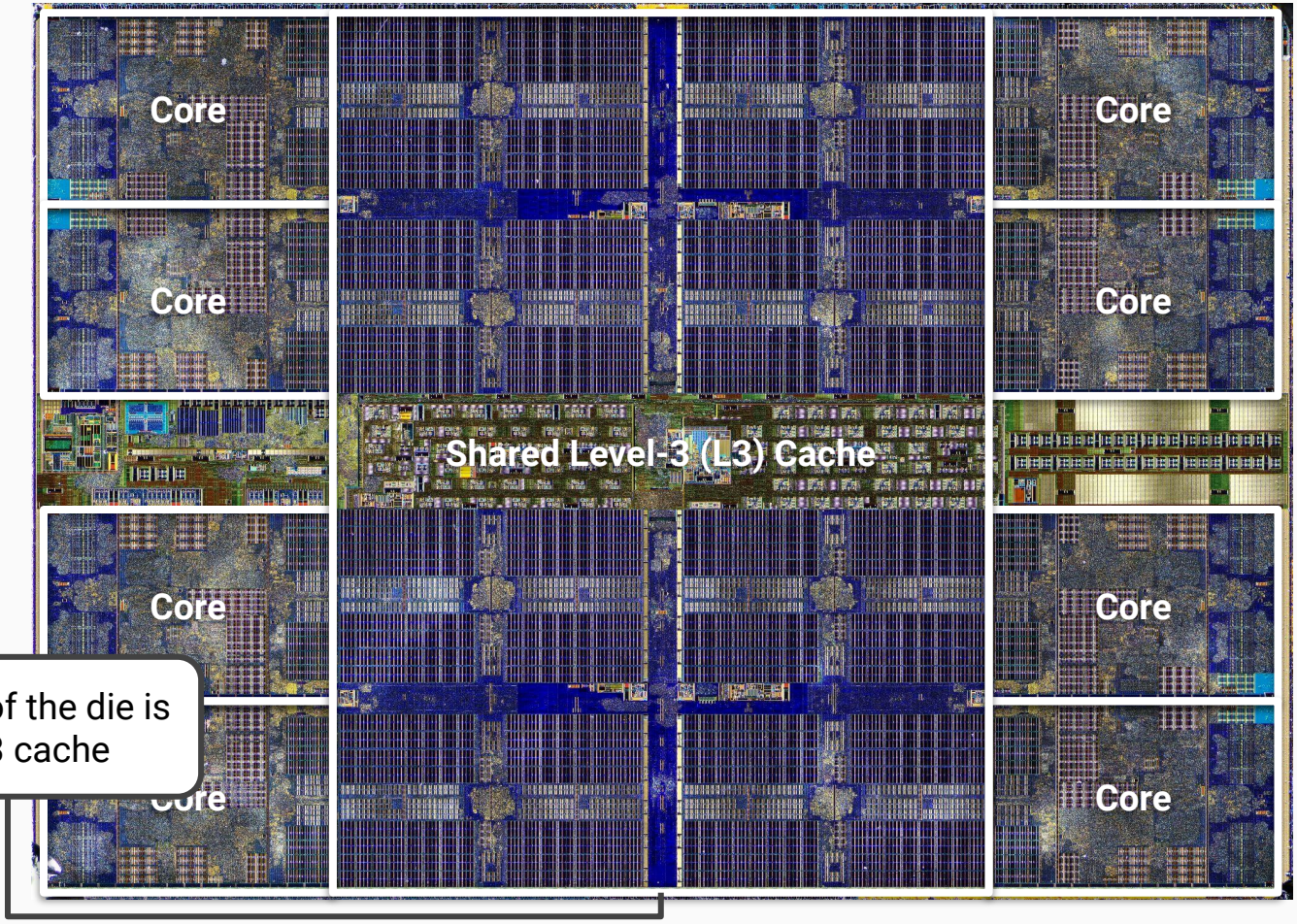
Fun fact...

From normal mode, you can type `dd` to delete the current line in vim

Getting Data Before It's Needed

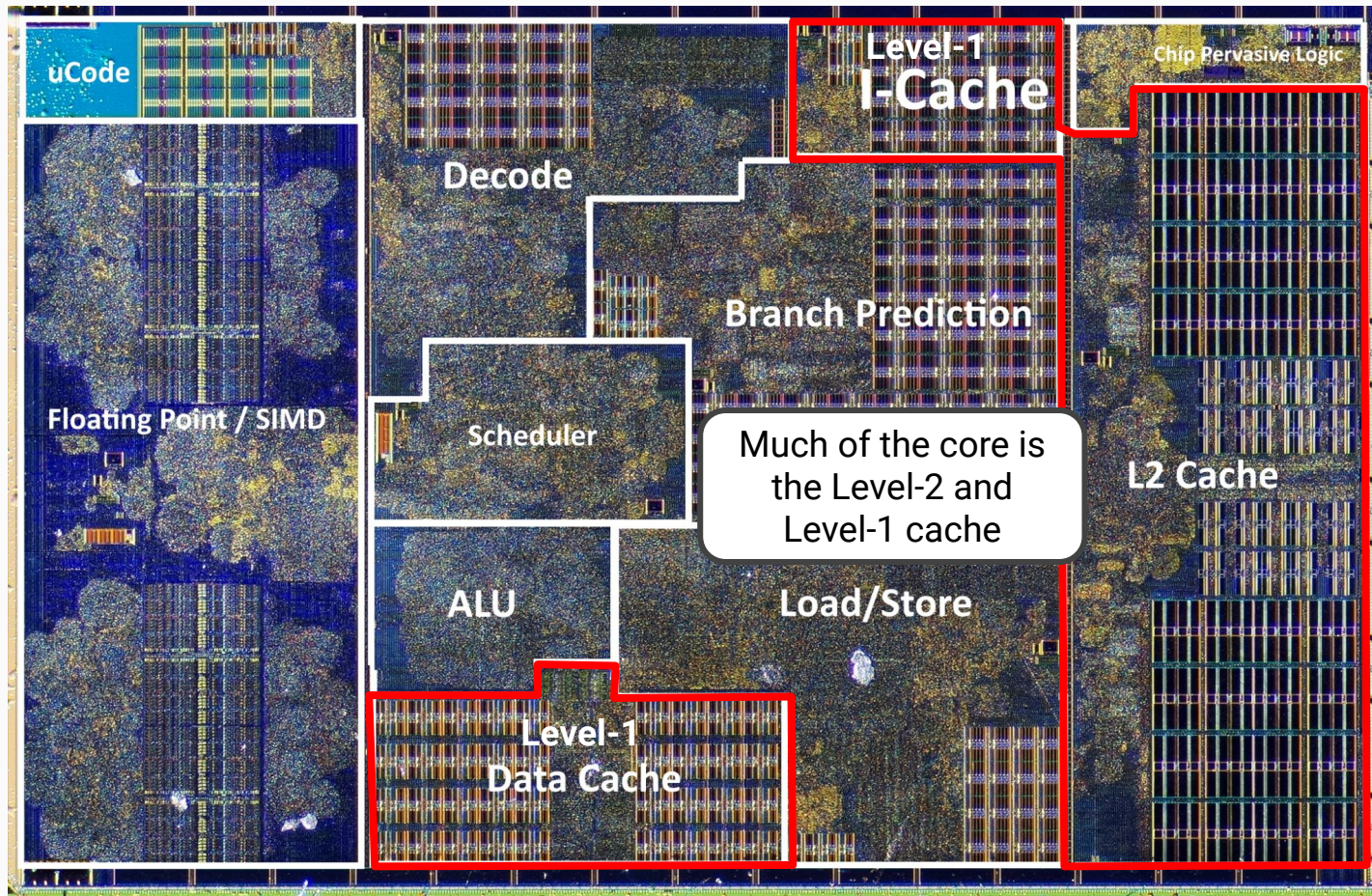
Beyond light speed, with caches and prefetching

Majority of the die is the L3 cache



Polysilicon layer of a Core Complex (CCX) Die of an AMD EPYC 7702 ES. Die size 10.32 mm x 7.34 mm.

Author: Fritzchens Fritz

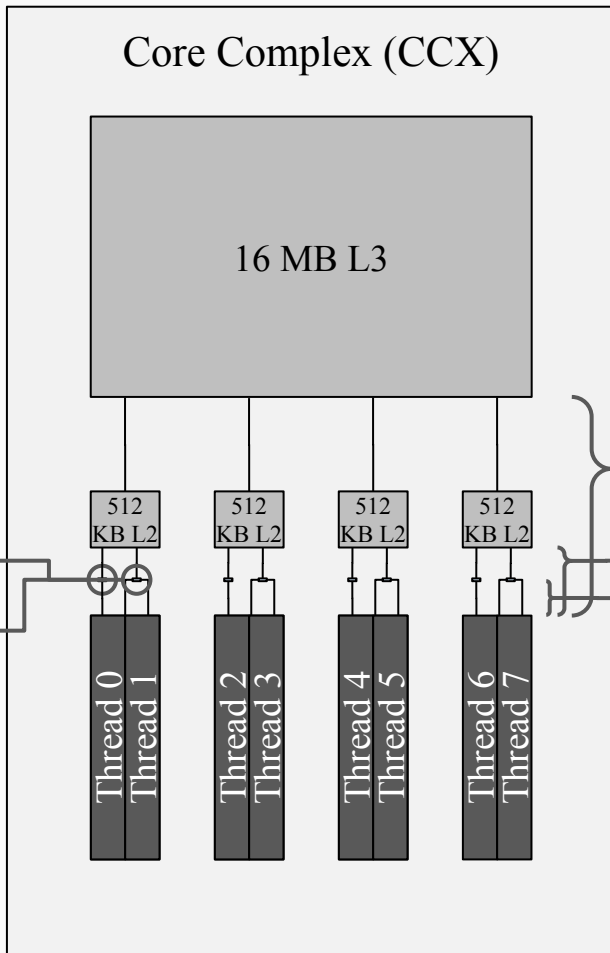


Polysilicon layer of a Core in a Core Complex (CCX)

Die of an AMD EPYC 7702 ES.

Author: Fritzens Fritz and moimoin

Throughput: (approx.)
 Core to L1I:
 - Load 32B/cycle
 Core to L1D:
 - Load 2x 32B/cycle
 - Store 1x 32B/cycle
 L1 to L2: 32B/cycle
 L2 to L3: 32B/cycle



The displayed size of each cache block is directly proportional to its actual memory size

L3 is 16-way
 L2 is 8-way
 L1 is 8-way
 64B line size
 32B inter-level link width

The displayed distance between the cores and each cache block is directly proportional to their access latency

Getting Data Before It's Needed

Locality

Temporal Locality: Recently referenced items are likely to be referenced again in the near future.

Implications:

- Best to keep most-recently-used data around, as it's likely to be used again soon

Spatial Locality: Items with nearby addresses tend to be referenced close together in time.

Implications:

- When fetching data, best fetch nearby data too

Questions?

Have a great spring break!

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