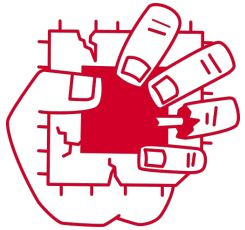
Když procesor netěsní

Michal Koutný, STG 2020-06-17



Zombieload (MDS)

I/2018

VII/2018

V/2019

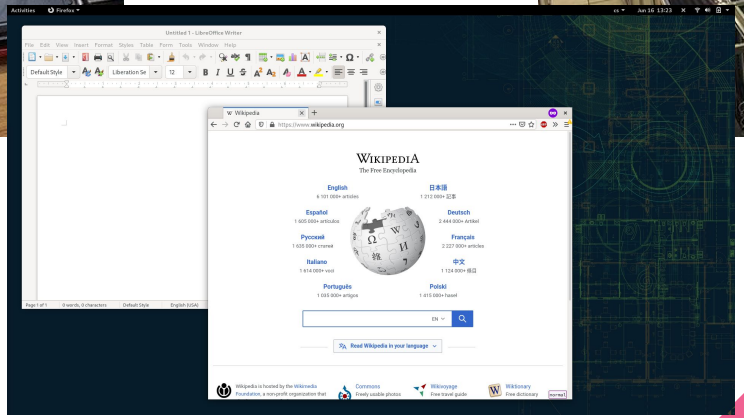
VI/2020

Crosstalk (SRBDS)

FORESHADOW

Bezpečnostní domény

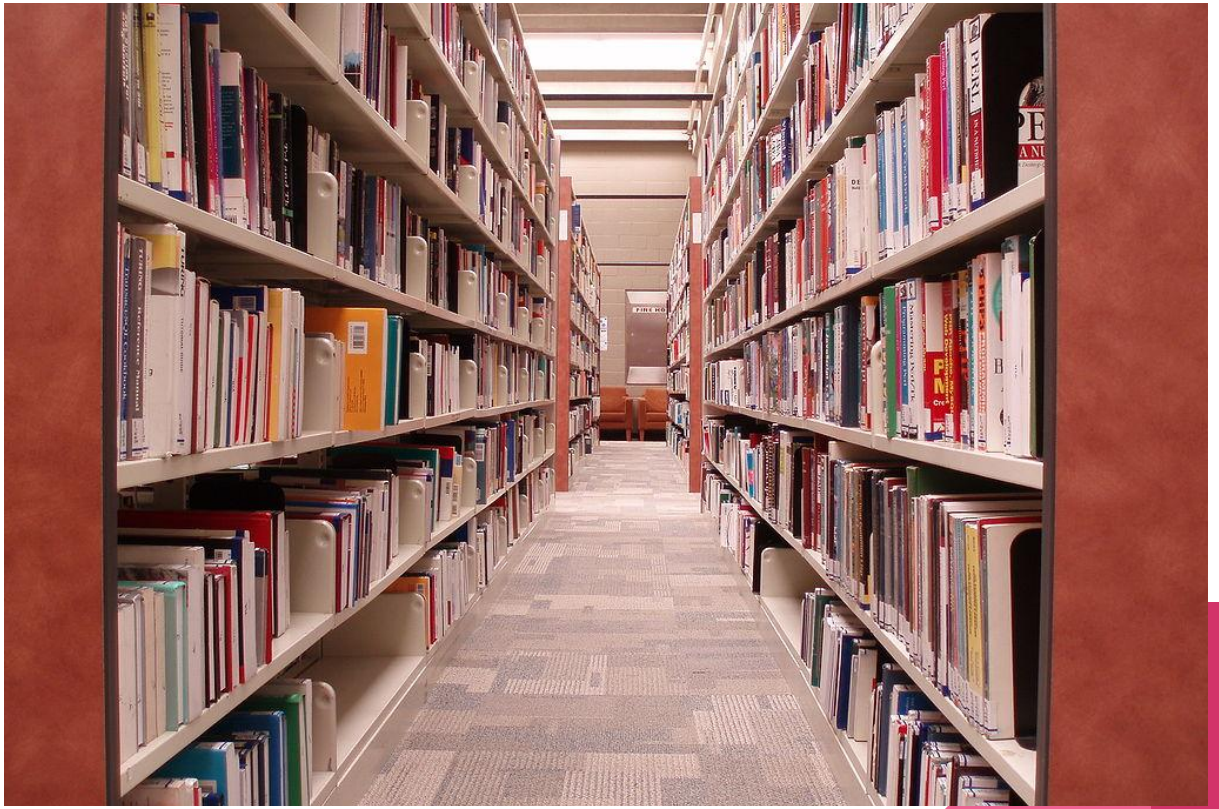
procesy



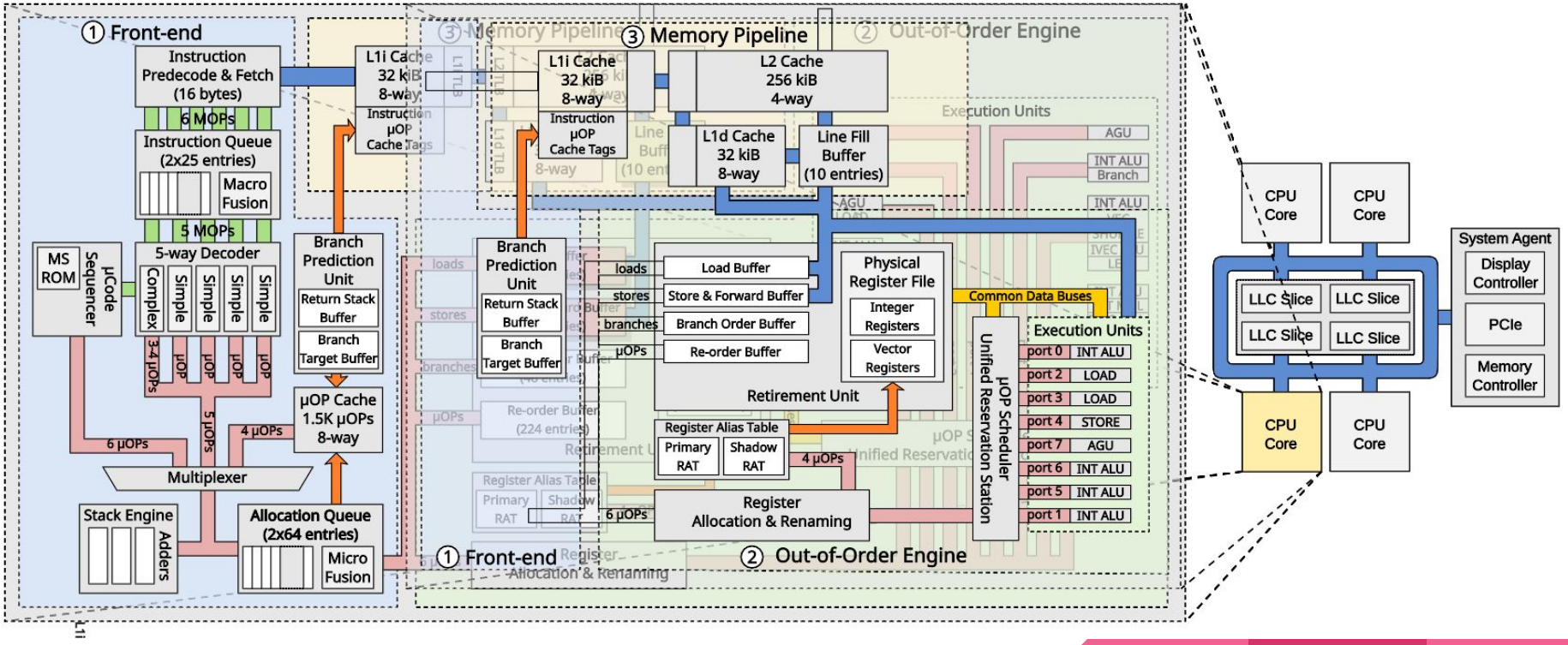
OS

cloud/VM

Které knihy jsou populární?



Architektura počítače*



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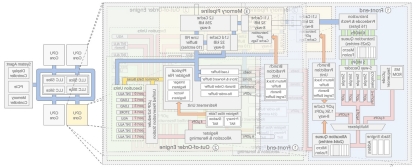
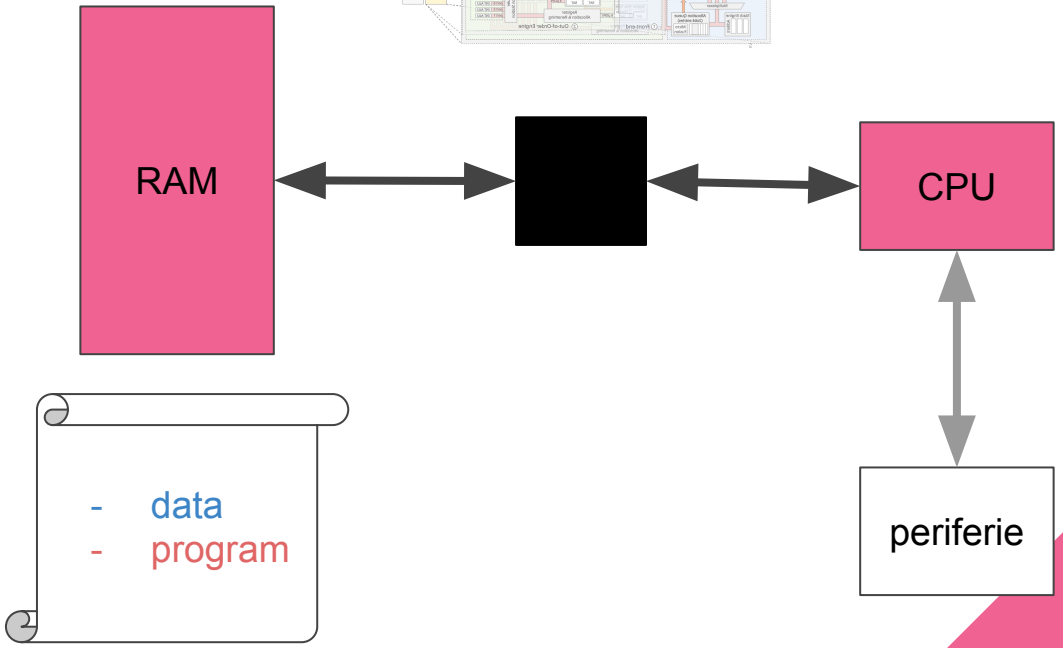
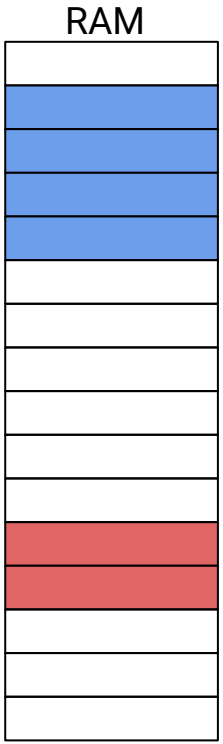
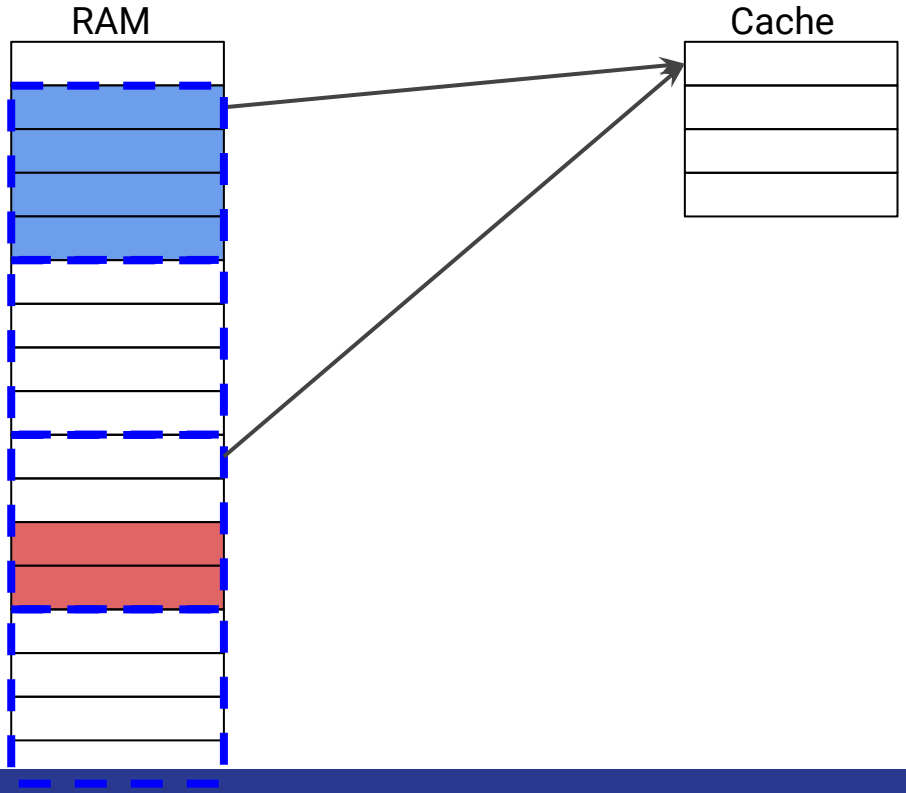




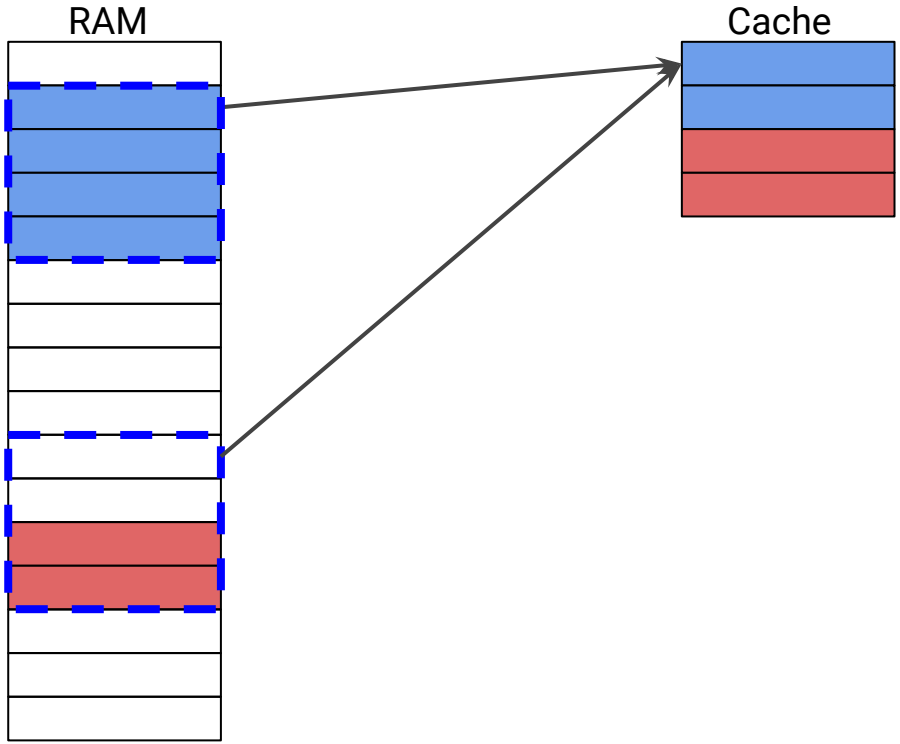
ASLR (address space layout randomization)



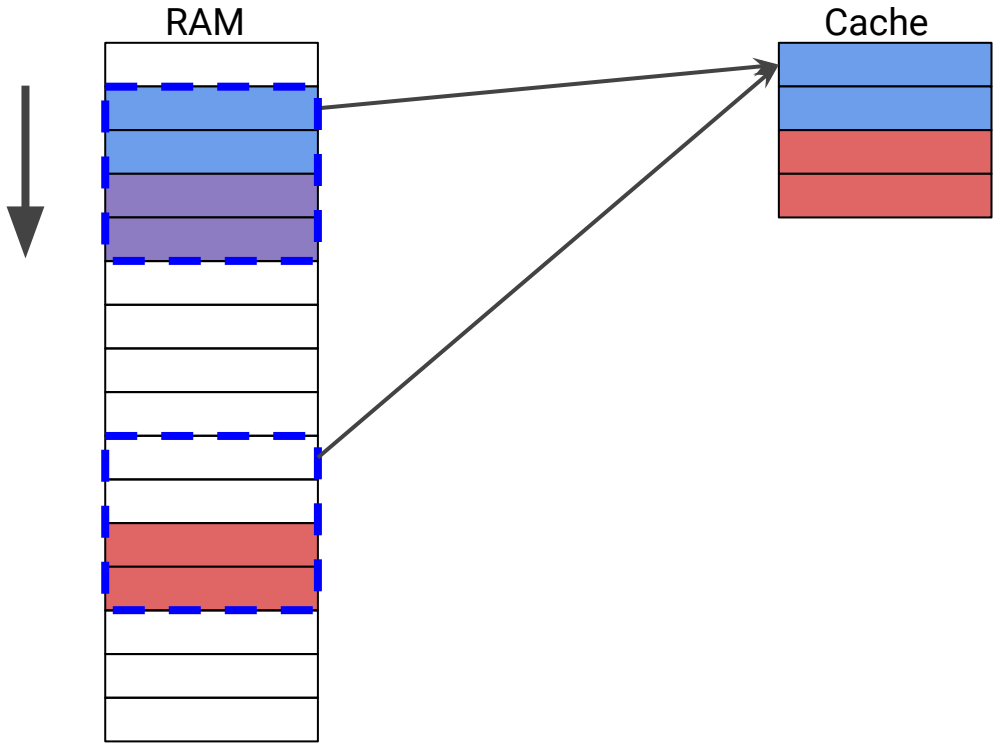
ASLR odhalení



ASLR odhalení

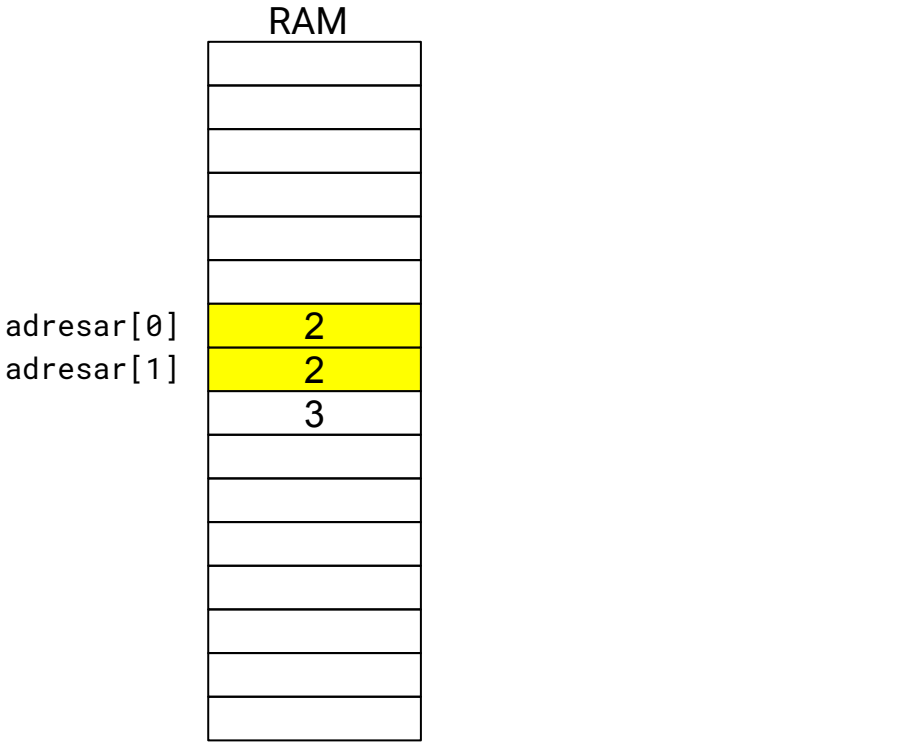


ASLR odhalení



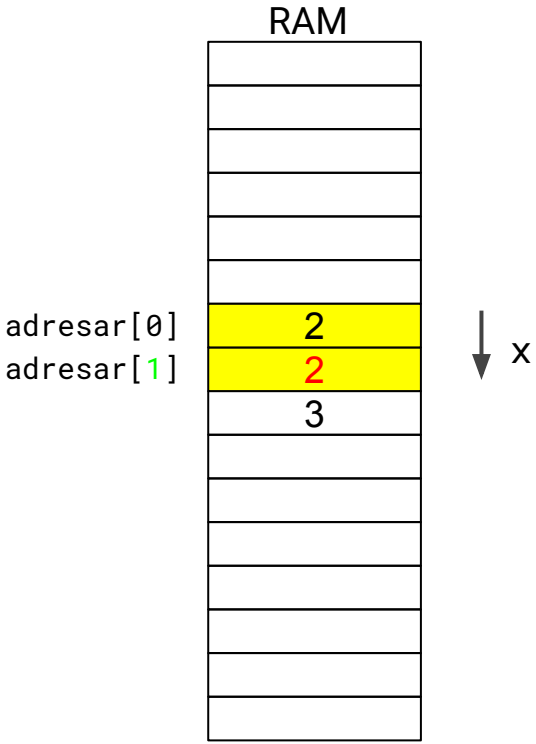
Víme kde

Spectre – úvod




```
if (x < A)
    tajne = adresar[x]
    cti(zaznamy[tajne])
else
    mimo_adresar()
```

Spectre – úvod

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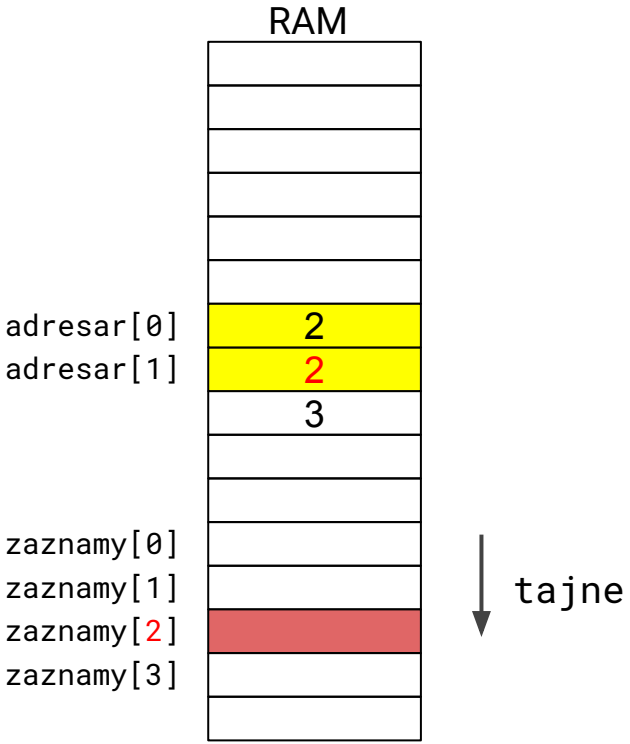


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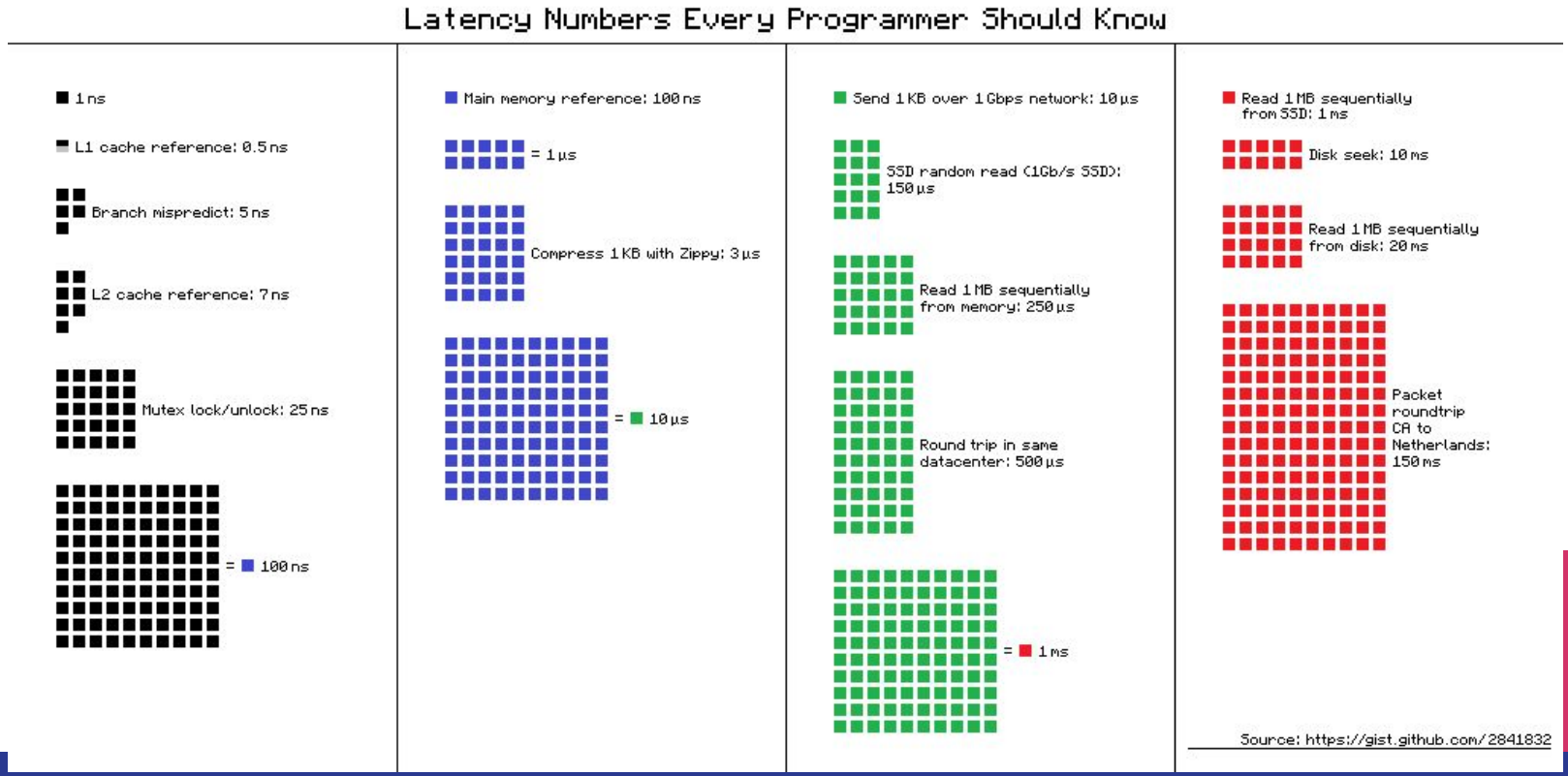
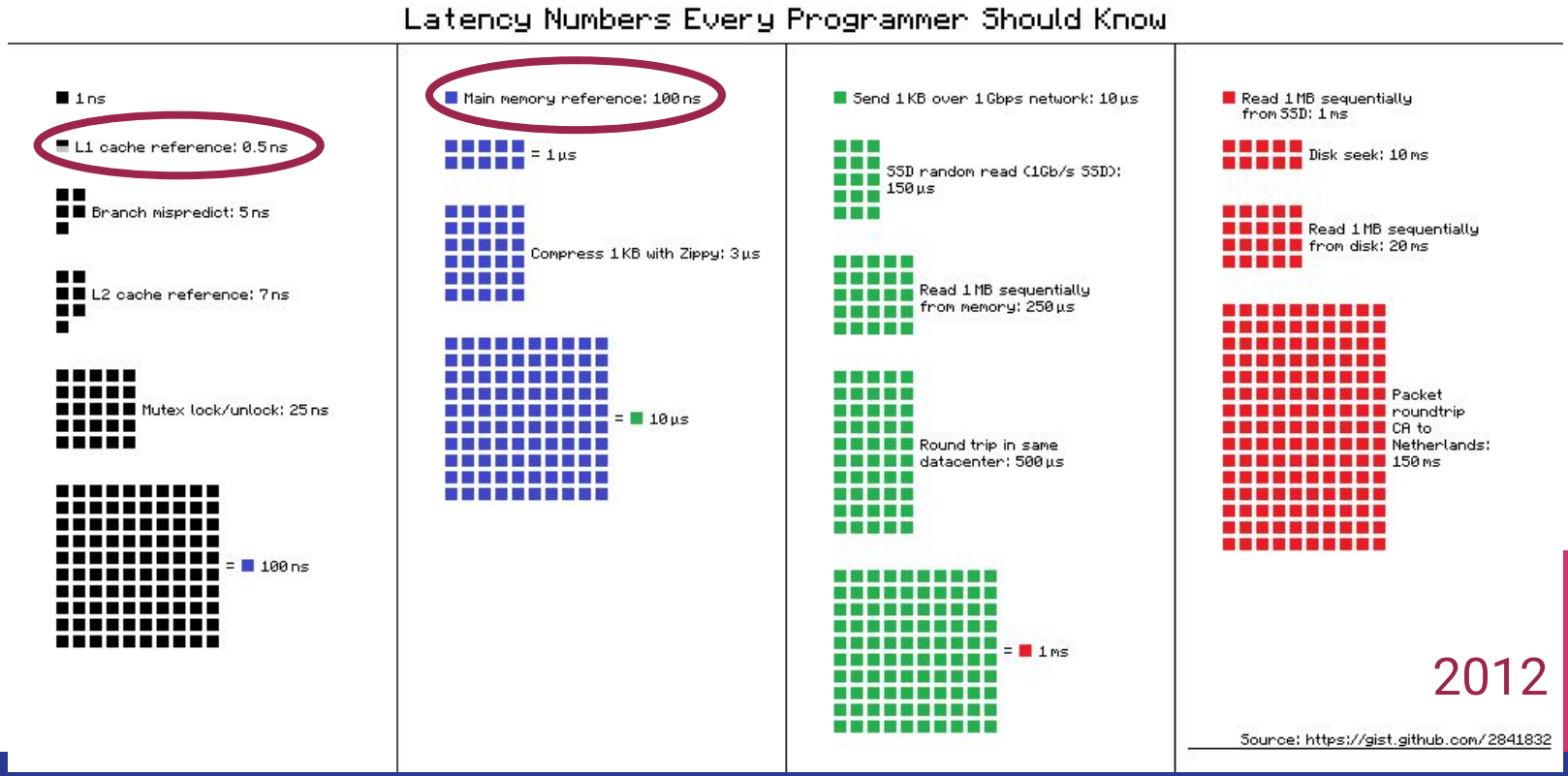
Čísla, co by měl znát každý (programátor)

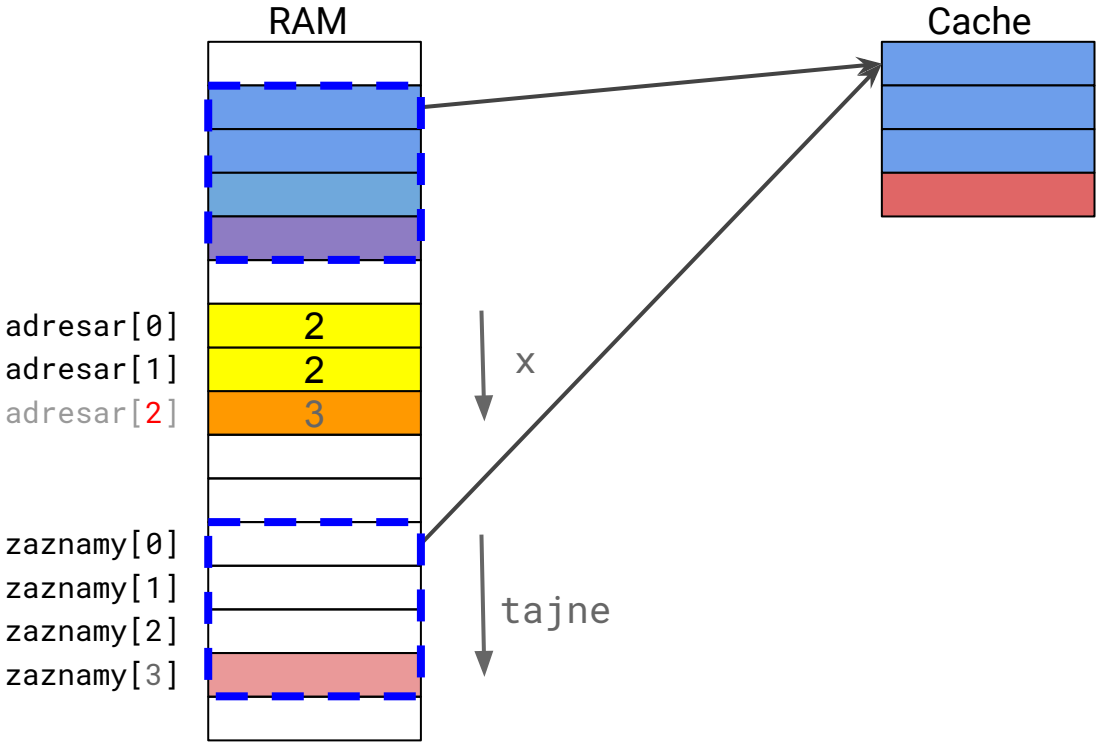


Čísla, co by měl znát každý (programátor)



2012

Spectre

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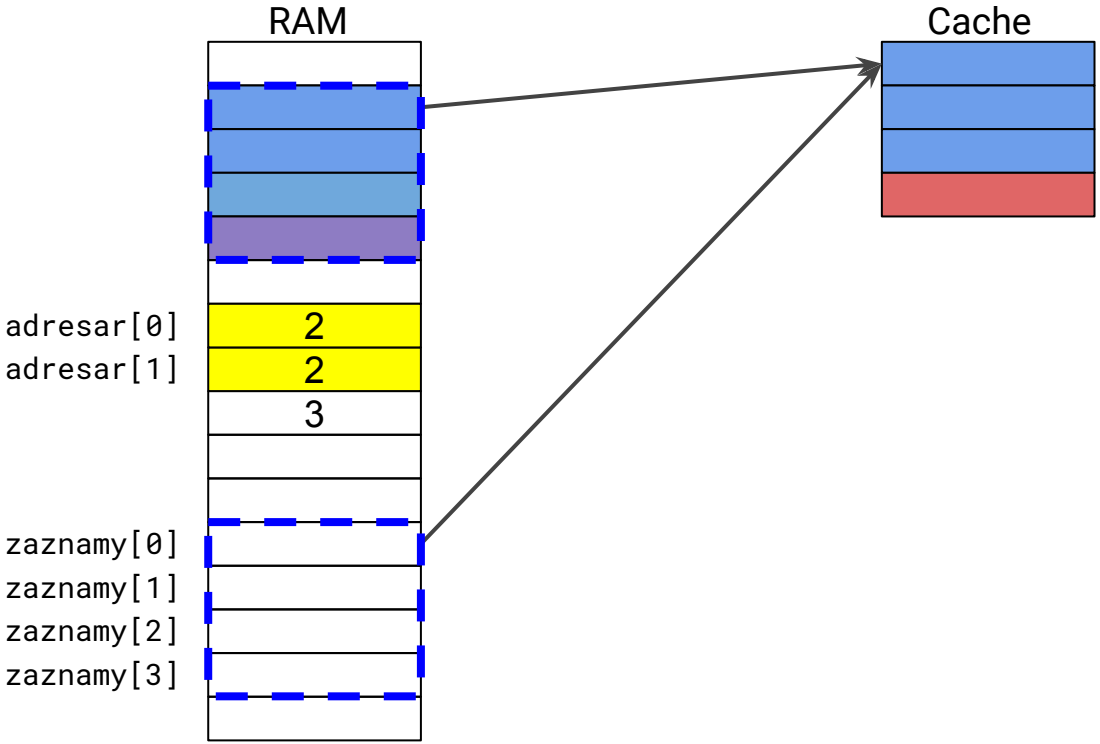
Spectre

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if (x < A)
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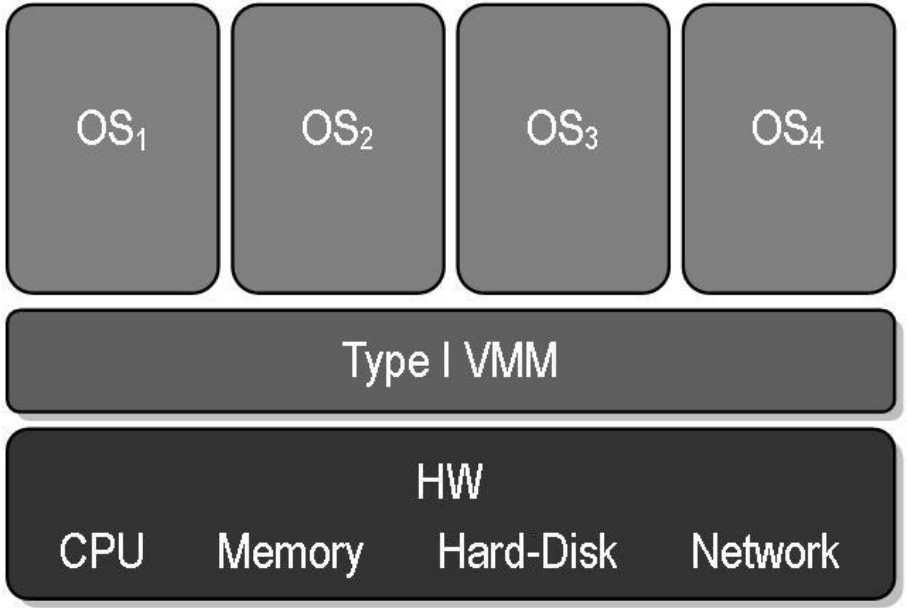
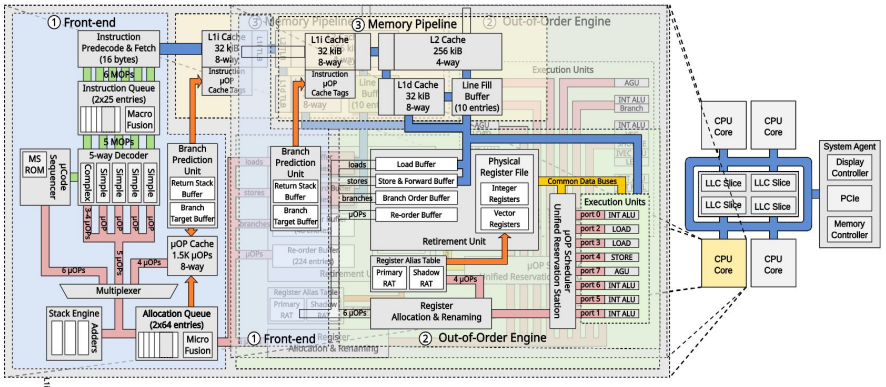
Víme co

Sdílení a virtualizace





Co to znamená v praxi

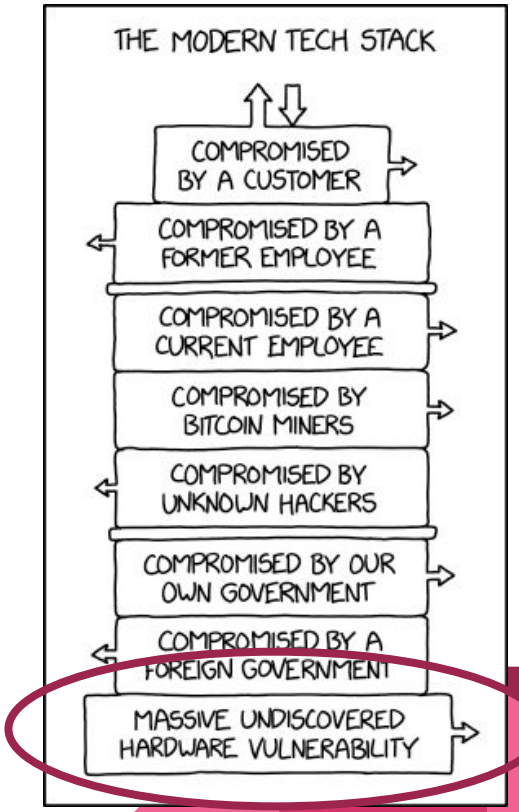
Zranitelnost	**Propustnost***
Meltdown	3,2–550 KB/s
Spectre	0,04–10 KB/s
Zombieload (MDS)	0,07–250 KB/s
Crosstalk	3 KB/s

Co to znamená v praxi 2

- Nový procesor
- Nový mikrokód
- Aktualizace SW
- Vypnutí SMT (symmetric multi-threading), core scheduling

Co to znamená v praxi 2

- Nový procesor
- Nový mikrokód
- **Aktualizace SW**
- Vypnutí SMT (symmetric multi-threading), core scheduling



Média

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Reference

- https://spectreattack.com/spectre.pdf
- https://meltdownattack.com/meltdown.pdf
- https://mdsattacks.com/files/fallout.pdf
- https://mdsattacks.com/files/ridl.pdf
- https://download.vusec.net/papers/crosstalk_sp21.pdf

Děkuji. Otázky?