

Current Trends



Macro Trends

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More companies making their own hardware

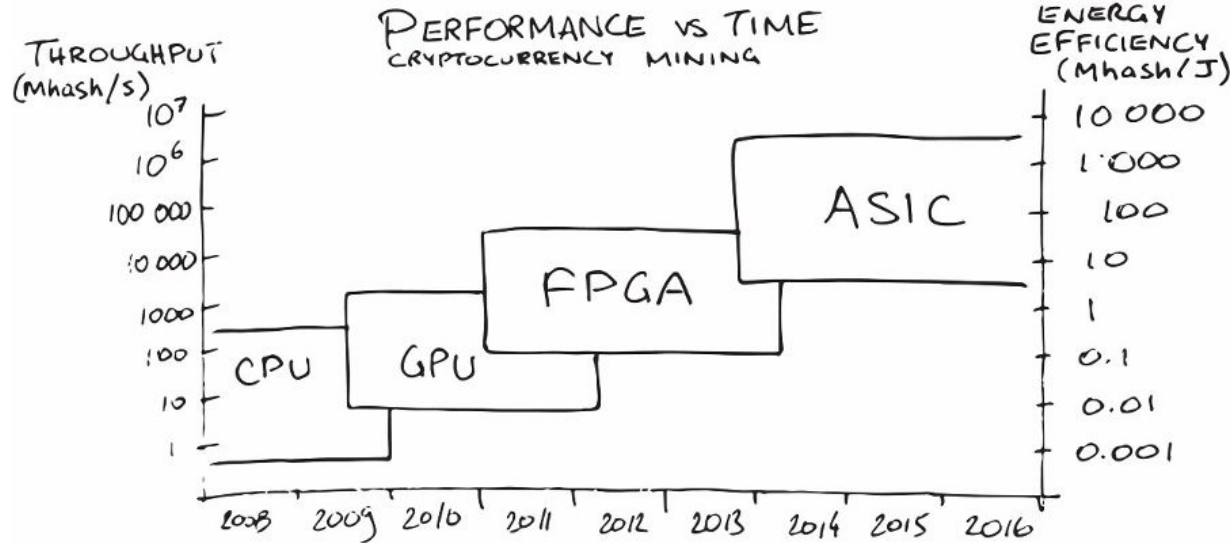
- Google - Tensor Chip - Custom ARM SoC - Pixel
- Apple - AppleSi - Custom ARM SoC - Macbook, iPhone, iPads
- Amazon - Graviton - Custom ARM CPU - Cloud
- Microsoft - Rumored to be working on custom ARM - Azure, Surface Devices

Macro Trends

- Crypto
- AI
- Cloud

Crypto

- GPUs favored over CPUs for crypto mining
- CPUs are able to perform complex instructions sequentially
- GPUs are able to do many simple instructions in parallel



AI

- Custom silicon for processing neural networks
- CPUs too general purpose to be performant/cost effective
- GPUs too expensive
- TPUs (Tensor Processing Unit) - Google's proprietary

Cloud

Pre-Cloud, every software company had to:

- Procure physical hardware
- Manage a data center
- Plan for scale

Cloud

- Azure
- AWS
- GCP
- Alibaba
- Salesforce
- etc



Google Cloud

Cloud



Cloud



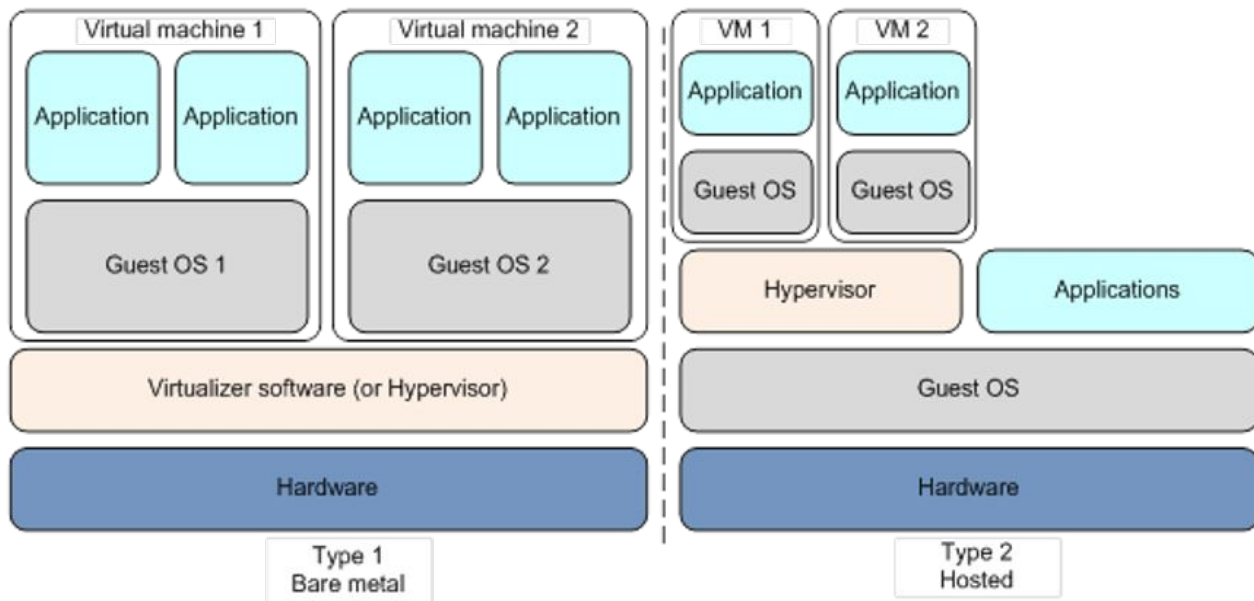
Micro Trends

SIMD

- Single Instruction, Multiple Data instructions
- Not all algorithms can be vectorized easily.
- Most compilers don't generate SIMD instructions from a typical C program
- Portability between processors of different sizes

Security

- Building security into the CPU
- TrustZones
- Exception Levels



Conclusion

Takeaways from this course

1. Computers are complicated
2. Signed vs Unsigned is the responsibility of the PROGRAMMER
3. Code and Data are just bits.

And bits are bits.

It is how they are interpreted that matters