

To assess an Architecture:

- Functions → Von Neumann.
- Performance.

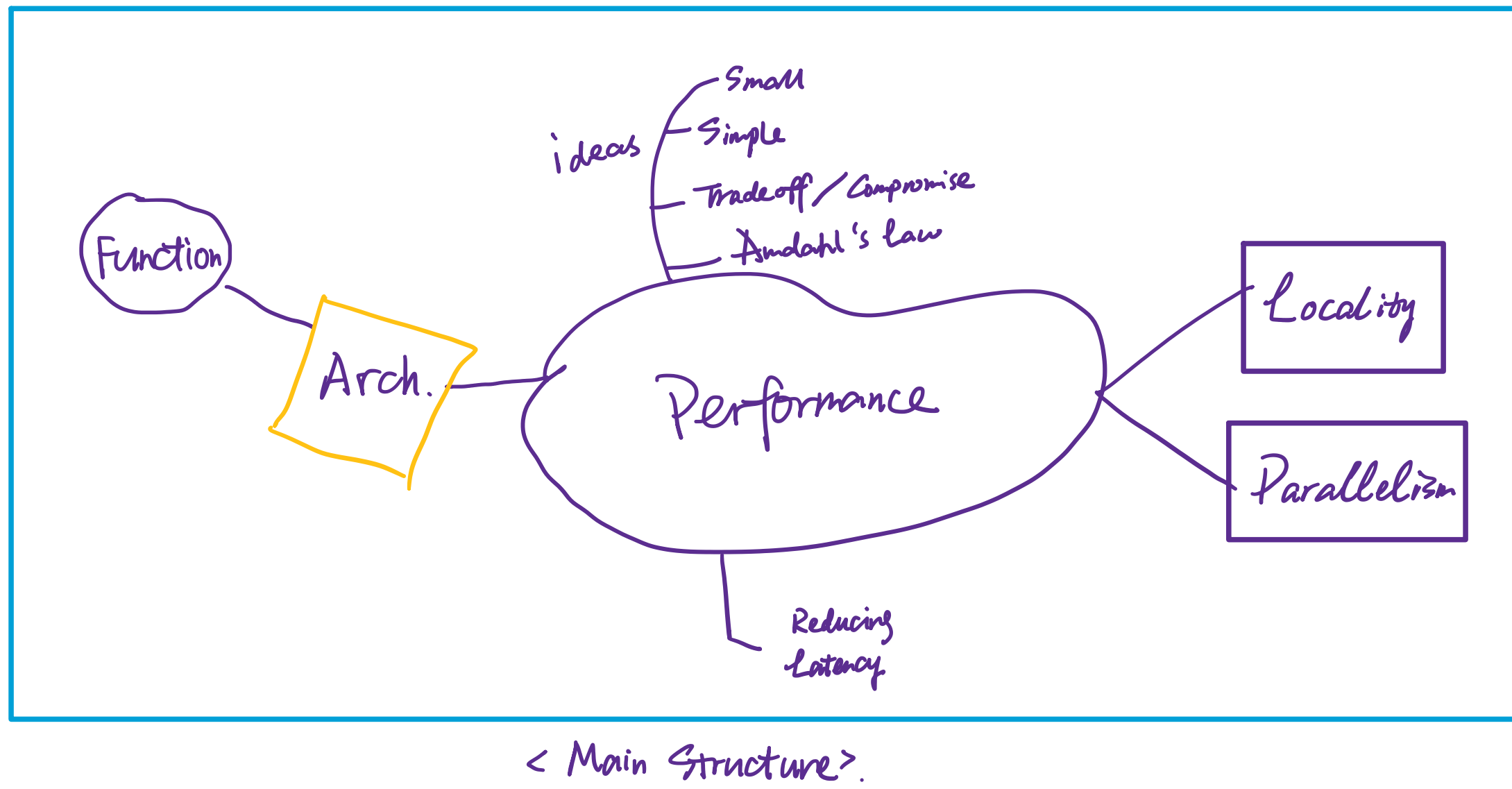
- Reduce Latency.
- Parallelism

* Pipeline
Super-Scalar

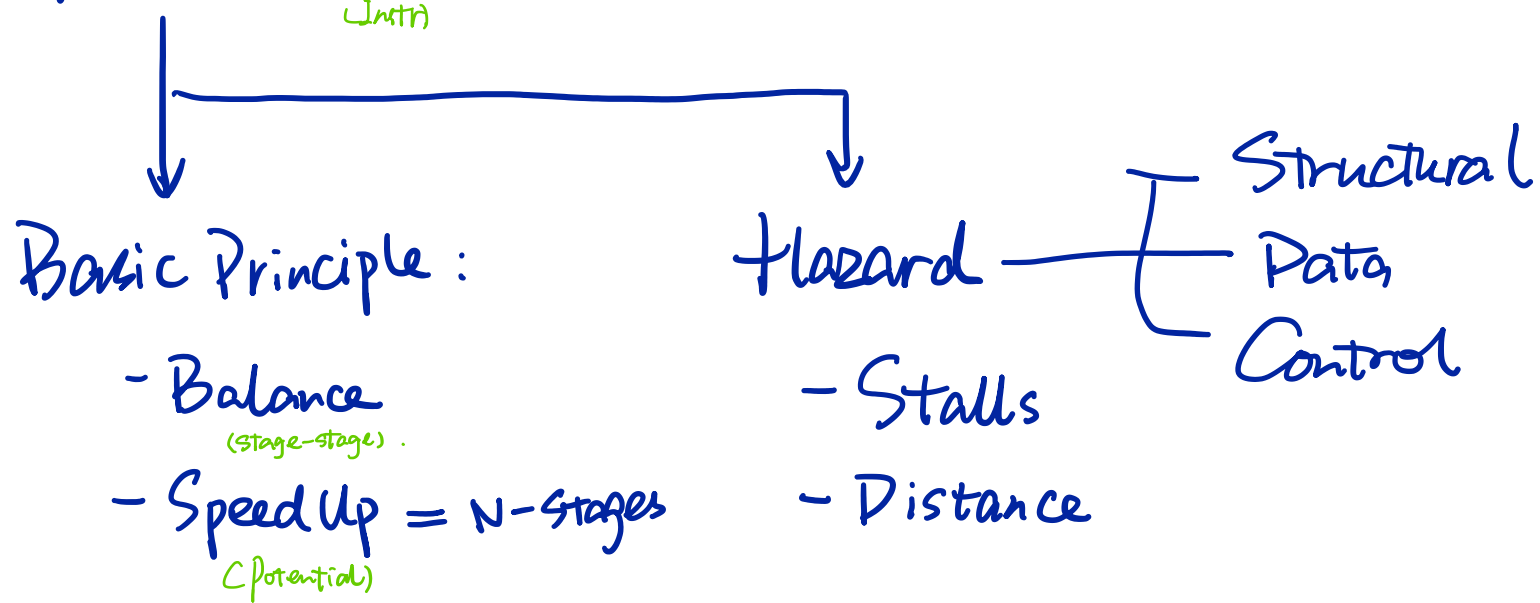
* Locality

* Cache

Ideas:
Small (fast)
Simple (Simplify Inst. Structure)
trade-off (don't go extreme)
Amdahl's Law: $S_p = \frac{1}{1-\eta + \frac{\eta}{S}}$
Make the most common faster.



Parallelism:
Pipeline (ILP).



① Structural Hazard
eg. Mem-Conflict

LD's 4th Stage (MEM)

IX's 1st Stage (IF).

Solution: I-Cache/D-Cache.
Duplicating

② Data-Hazard

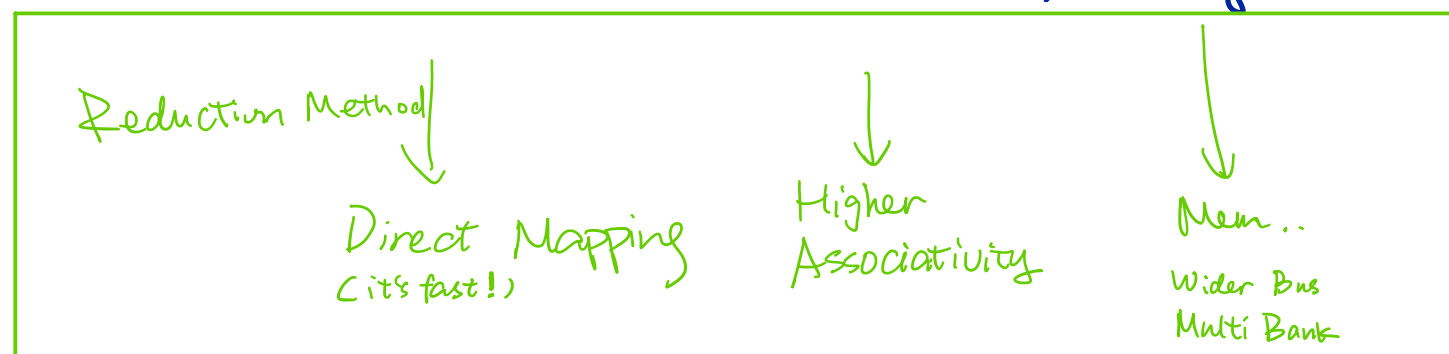
- True f Small Inst - Forwarding
Large Inst - Out Of Order (stomach)
- Pseudo Renaming Regs.

③ Control Hazard.

- Early decision
- Prediction (Speculation)
- Calculate Target
- Delay Slot.
- Kill Br

Locality: Cache

$$AMAT = T_{hit} + \eta_{miss rate} \times T_{penalty}$$



DM Cache Structure

