MultiCore and ManyCore vs FineGrain DataFlow or ControlFlow vs DataFlow

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MultiCore

DualCore?

Where are the horses going?

ManyCore

- Is it possible
  to use 2000 chicken instead of two horses?

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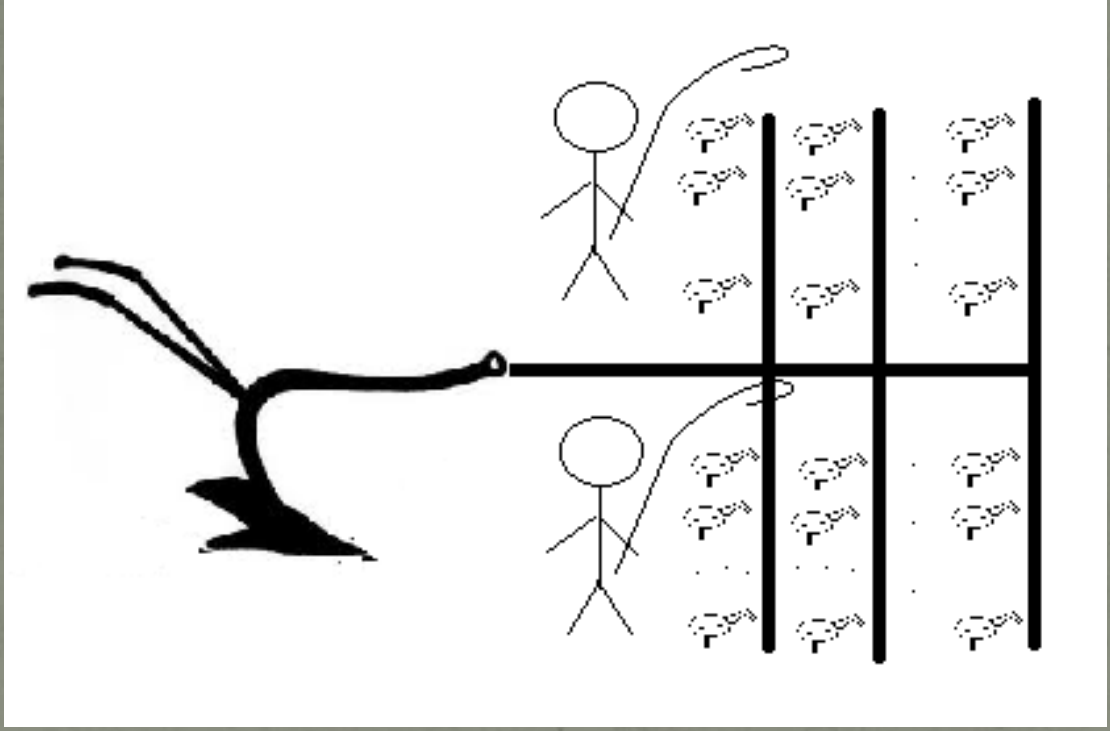
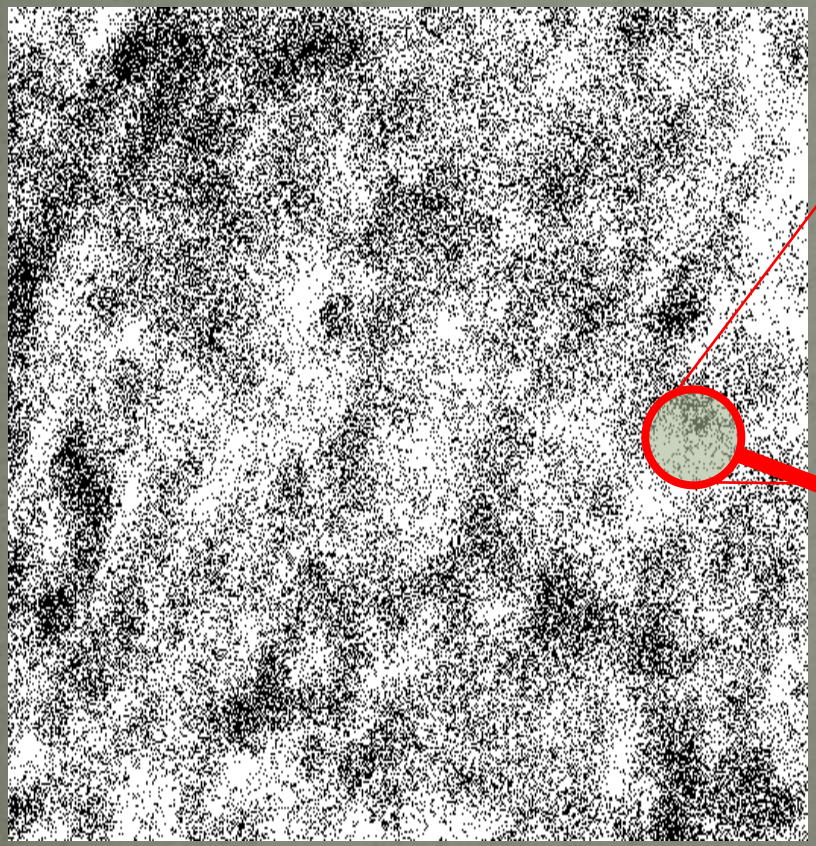
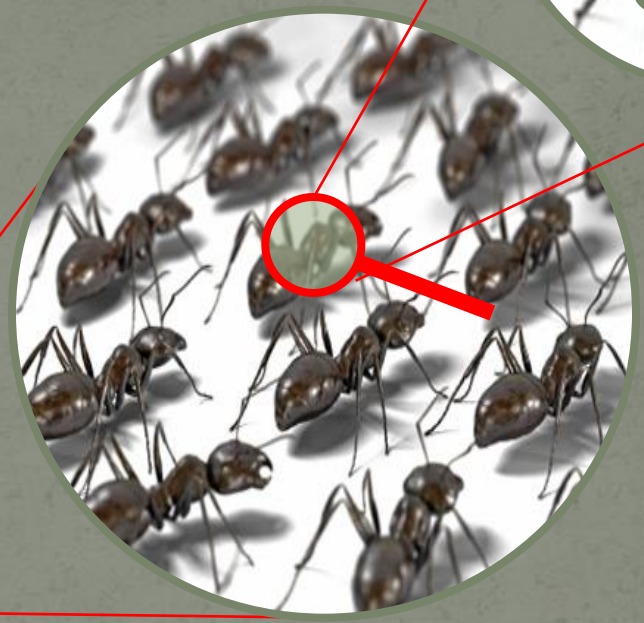
ManyCore



2 x 1000 chickens

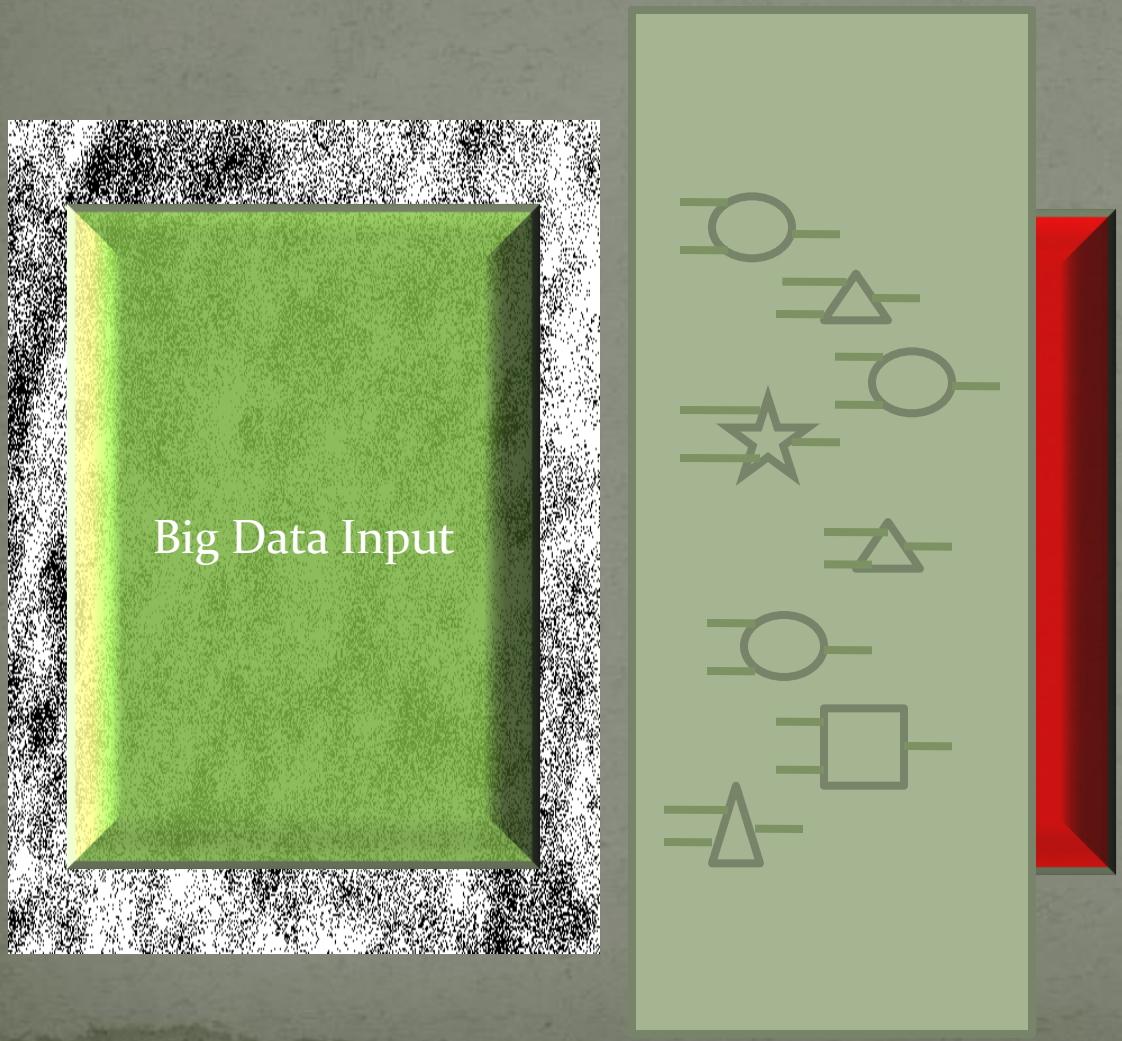
DataFlow





How about 2 000 000 ants?

DataFlow

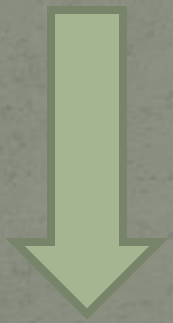


Marmalade

Why is DataFlow so Much Faster?

- Factor: 20 to 200

MultiCore/ManyCore



Machine Level Code

DataFlow

Gate Transfer Level

Why are Electricity Bills so Small?

- Factor: 20

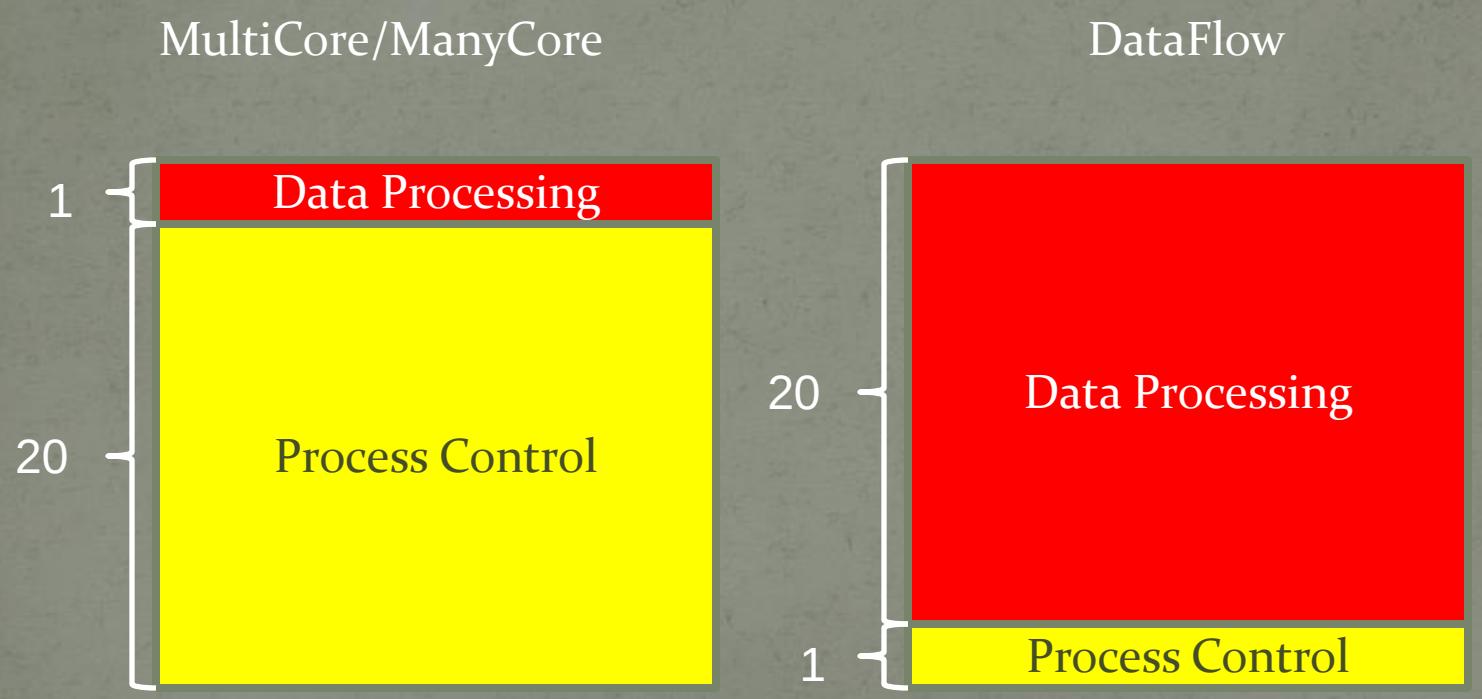
MultiCore/ManyCore

DataFlow

$$P = C*U^2*f$$

Why is the Cubic Foot so Small?

- Factor: 20



Required Programming Effort?

- MultiCore:
  - Explain what to do, to the driver
  - Caches, instruction buffers, and predictors needed
- ManyCore:
  - Explain what to do, to many sub-drivers
  - Reduced caches and instruction buffers needed
- DataFlow:
  - No caches, instruction buffers, or predictors needed: C_{min}
  - Make a field of processing gates: +5 Java programs

Required Debug Effort?

- MultiCore:
  - Business as usual
- ManyCore:
  - More difficult
- DataFlow:
  - Much more difficult
  - Debugging both, application and configuration code: 5 Java + C_{min}

Required Compilation Effort?

- MultiCore/ManyCore:
  - Several minutes
- DataFlow:
  - Several hours (to configure the FPGA structures)
  - Future: Xilinx, Altera,
    Achronix (UCB 1GHz), Tabula (MIT, 1.6GHz)

Now the Fun Part

Required Space?

- MultiCore:
  - Horse stable

- ManyCore:
  - Chicken house

- DataFlow:
  - Ant hole

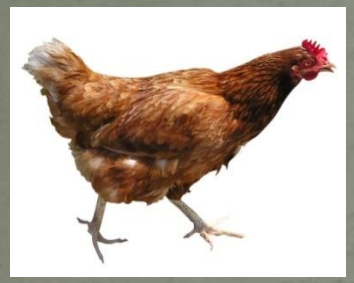
Required Energy?

- MultiCore:
  - Haystack

- ManyCore:
  - Cornbits

- DataFlow:
  - Crumbs

Why Faster?

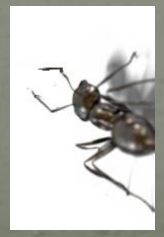


Small Data

Why Faster?

Medium Data

Why Faster?



Q&A = ?