Multi-Context FPGAs

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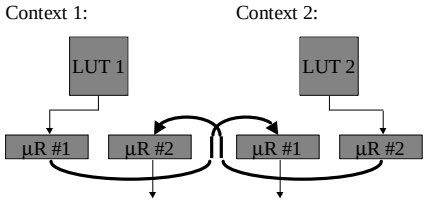
Modes of Operation

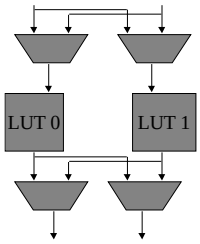
- Logic Engine Mode
  - "emulate a single, large design"
  - Multiple FPGA cycles per virtual cycle
- Time-Share Mode
  - "emulate several independent, communicating FPGAs."
- What's it gonna be?

Logic Engine Mode

- What does the virtual FPGA look like?
- Micro-registers



One Virtual Model



Other Virtual Models?

- Dharma
- Tiled?

Multi-context Problems

- Efficiency:
  - 8 context = 3 x size
  - Enough?
  - Requires chaining
- Power:
  - Reconfiguration = 10s of watts
  - Dharma?

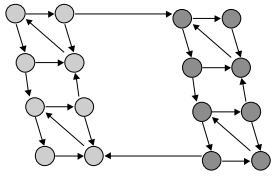
Time-Share Mode

- Multi-user cycles per configuration
- 8 FPGAs in same physical place
  - Interfacing at I/Os (independent)
- Cut down on reconfiguration
  - Background while operating on another
- One config for input, one for output

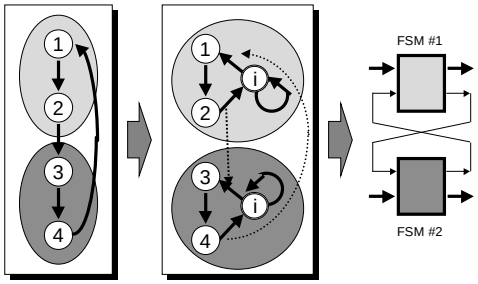
Middle Mode

- What if logic changes gradually?
- Finite State Machine:

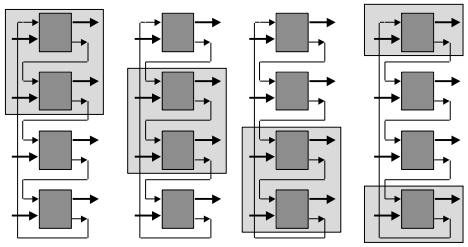
  In a “flat” implementation most logic inactive



FSM Partitioning

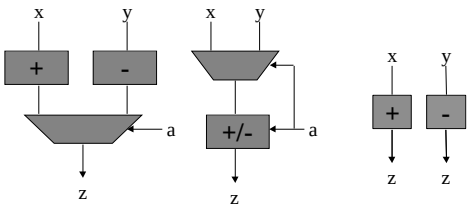
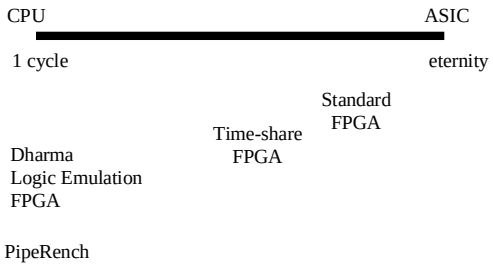


FSM Virtualization



Data Dependency Reconfiguration

Example: z = (a==1) ? x + 1: y - 3



Reconfiguration Continuum