Digital Design Tools David Dalrymple



.fab

- Many representations
- One format

.fab 2.0

- Many functions
- One representation



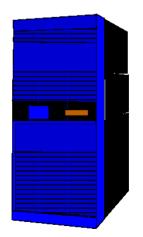
Conformal Computing

- Atiny45 small, cheap MIPS
- Put many together
- Lots of MIPS
- Roll-to-roll process
- Grid layout
- Programming a challenge



Parallelism

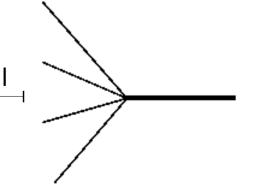
- Traditional Parallel Methods
- Server clusters
- Neural Networks
- Compromise



Expensive

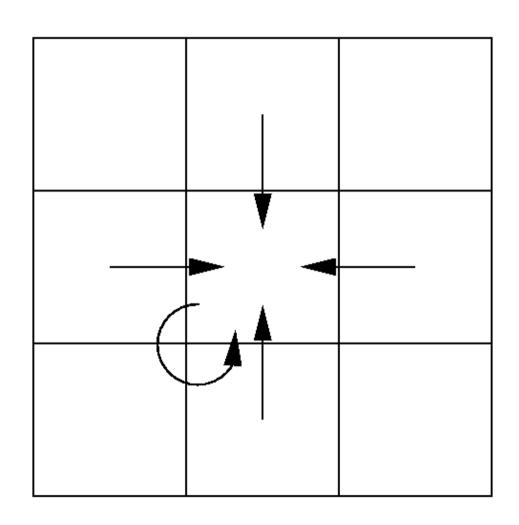
Non-universal





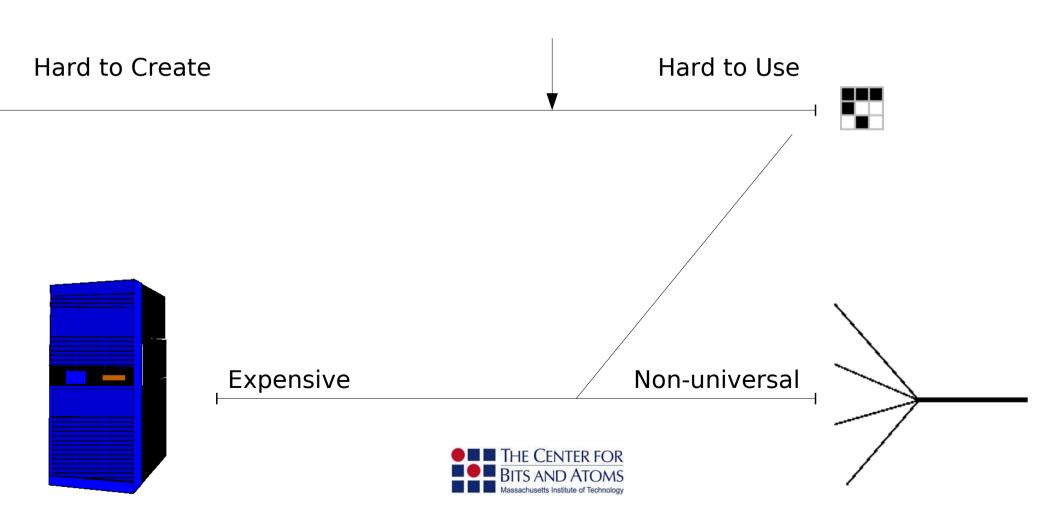
Cellular Automata

- Cell
- State (bitstring)
- Time Step
- Neighborhood
- Rule Table
- Next State





Cellular Automata



State and Rule Table

Hard to Use Hard to Create



- Open Question
- Works Already!

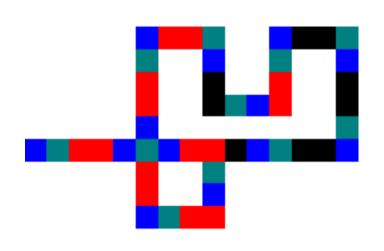


Computation on a Lattice

- Simple, explicit rules
- Any medium
- Program = picture = computer



Easier?



VS.

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pushl
        %ebp
        %esp, %ebp
mov1
        $4, %esp
sub1
        8(%ebp), %eax
mov1
mov1
        %eax, -4(%ebp)
L1:
        12(%ebp), %eax
mov1
        $0, (%eax)
cmpb
        L2
jne
        8(%ebp), %edx
mov1
        12(%ebp), %eax
mov1
movzbl (%eax), %eax
        %al, (%edx)
movb
        8(%ebp)
incl
lea1
        12(%ebp), %eax
incl
        (%eax)
jmp
        L1
L2:
mov1
        -4(%ebp), %eax
1eave
ret
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Specalize Rules

- Circuits
- Convection Currents
- Constrained Optimization
- Next version of cam.py



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cam.py

$$\mathsf{VS}_{ullet}$$
 toolpath = (conv == 0) & (n | s | e | w)



GIK

- Assembled as voxels
- 3D lattice
- GIK design tool



Lattices

- Many functions
- One representation
- .fab 2.0

