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

Hard to Create

Expensive

Non-universal

Hard to Use

The Center for Bits and Atoms
Massachusetts Institute of Technology
State and Rule Table

- Open Question
- Works Already!
Computation on a Lattice

• Simple, explicit rules
• Any medium
• Program = picture = computer
Easier?

```
pushl %ebp
movl %esp, %ebp
subl $4, %esp
movl 8(%ebp), %eax
movl %eax, -4(%ebp)
L1:
    movl 12(%ebp), %eax
cmpb $0, (%eax)
jne L2
movl 8(%ebp), %edx
movl 12(%ebp), %eax
movzbl (%eax), %eax
movb %al, (%edx)
incl 8(%ebp)
lea 12(%ebp), %eax
incli (%eax)
jmp L1
L2:
movl -4(%ebp), %eax
leave
ret```

Specalize Rules

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

VS.

toolpath = (conv == 0) & (n | s | e | w)
GIK

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

• Many functions
• One representation
• .fab 2.0