

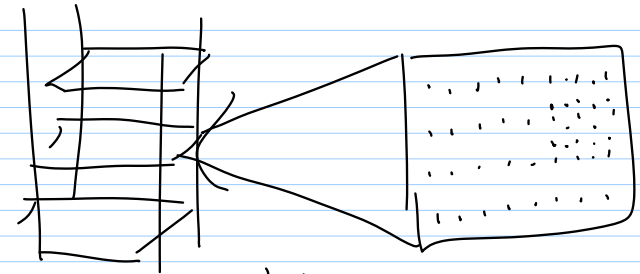
Applications

Logic Simulation

Ocean Sim

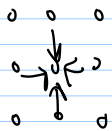
Evolution of Galaxies

Rendering Scenes via Ray Tracing



discretize in time & space

start w/ 2-d version of problem



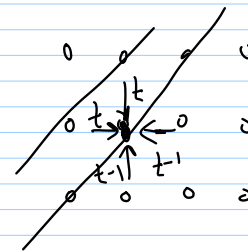
$$A(i,j) \leftarrow f(A(i,j), A(i-1,j), A(i,j-1), A(i+1,j), A(i,j+1)))$$

Gauss-Jacobi

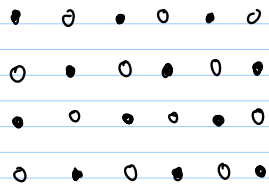
```
for t=1, N
  for all i, j
    update A in parallel
  endfor (barrier)
endfor
```

Gauss-Seidel

$$A^{t+1} \leftarrow A^t(i+1, j+1) \text{ and } A^{t+1}(i-1, j-1)$$

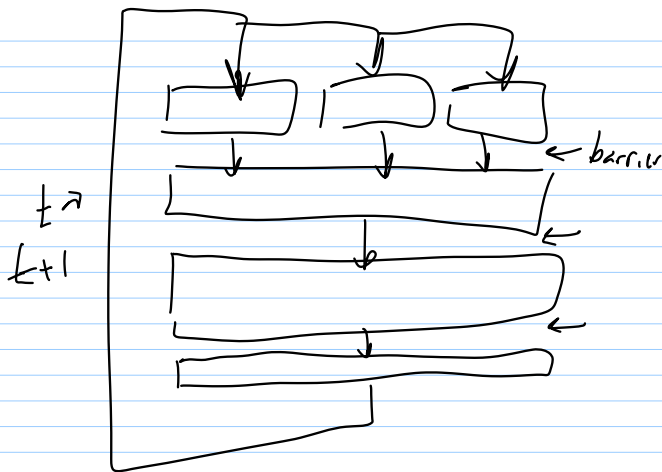
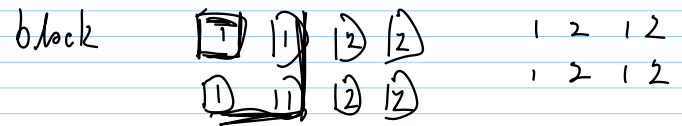
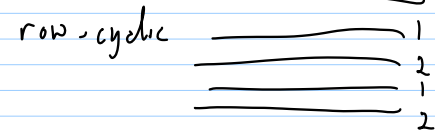
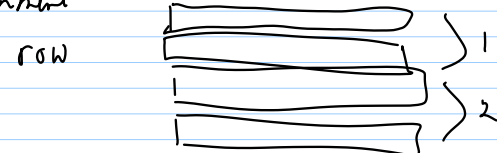


Red-Black



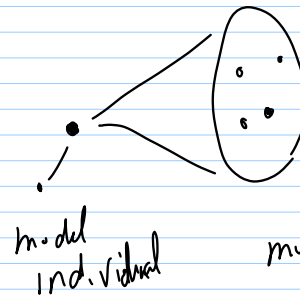
update black elements w/ "old" red values
 " red " w/ "new" black "

assignment



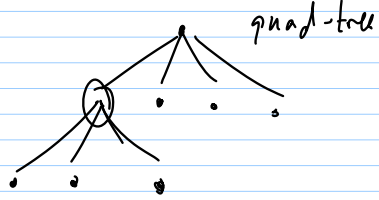
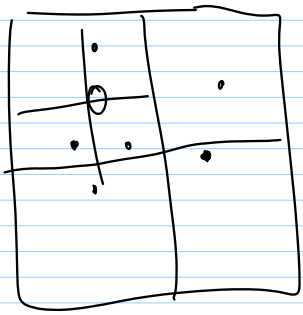
data decomposition
 => "owner" computes

N-body simulation



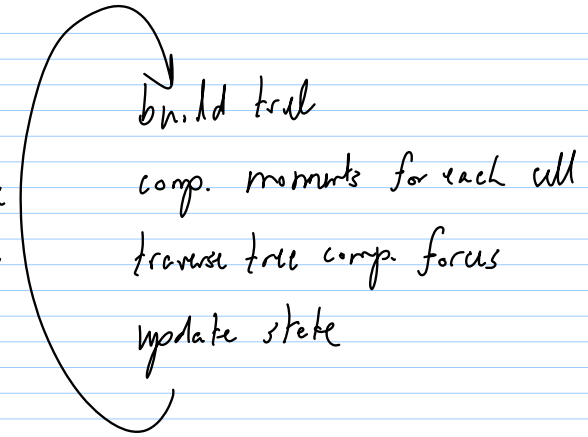
$$f = G \frac{m_1 m_2}{r^2}$$

Barnes-Hut

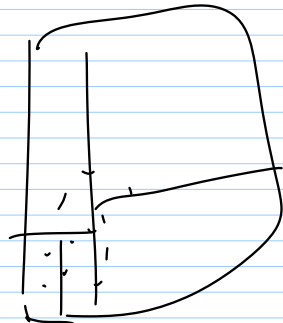
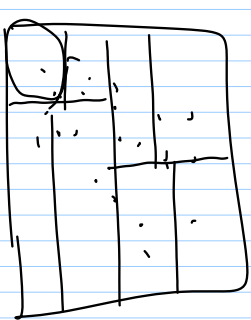


\approx unif dist of particles
 $\Rightarrow O(n \log n)$

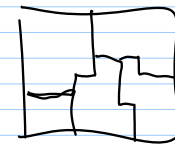
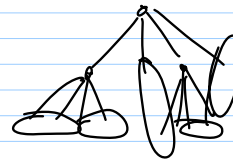
update time



orthogonal recursive bisection



cost zones



more common

