

Fishy Code Results

UPC & Knapsack

CS 267 Spring 2005

Yozo Hida

yozo@cs.berkeley.edu

April 1, 2005

Outline

Fishy Code Results

Knapsack Problem

Final Project

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Fishy Code Results

Knapsack Problem

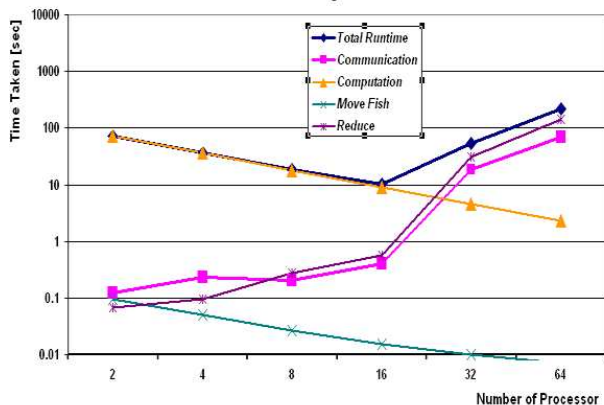
Final Project

Fishy Code Results

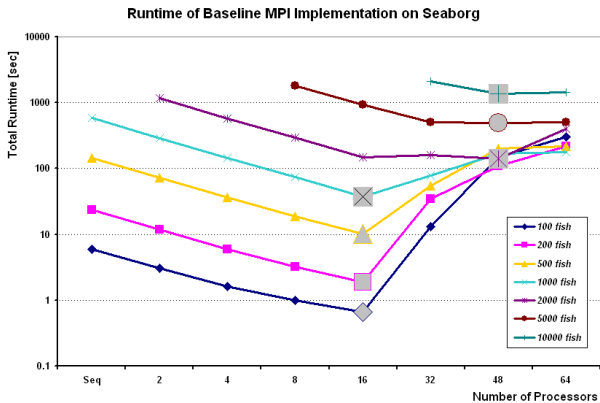
- ▶ $O(n^2)$ algorithm. What does it mean on importance of communication?
- ▶ Large block size of around 200.
- ▶ Optimization of sequential code: division, blocking, memcpy.
- ▶ Communication optimization: what, when, and how to send.

Fishy Code Results

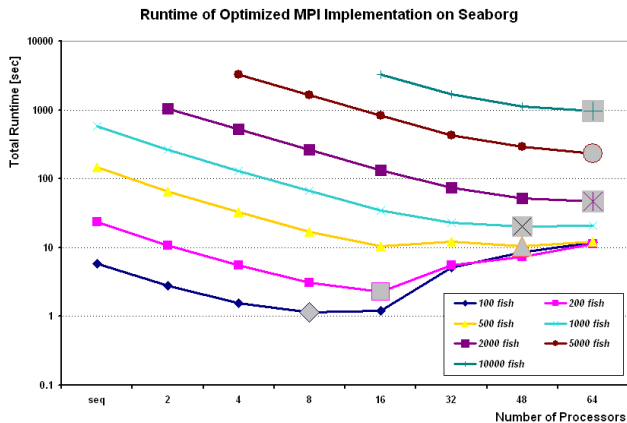
Relative Contributions of Baseline MPI Routines for 500 Fish on Seaborg



Fishy Code Results



Fishy Code Results

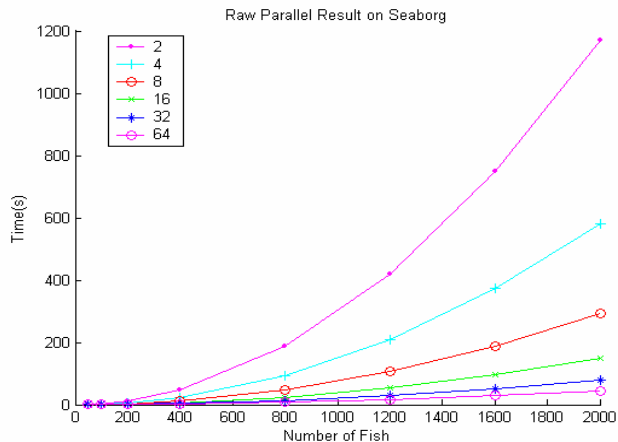


Fishy Code Results

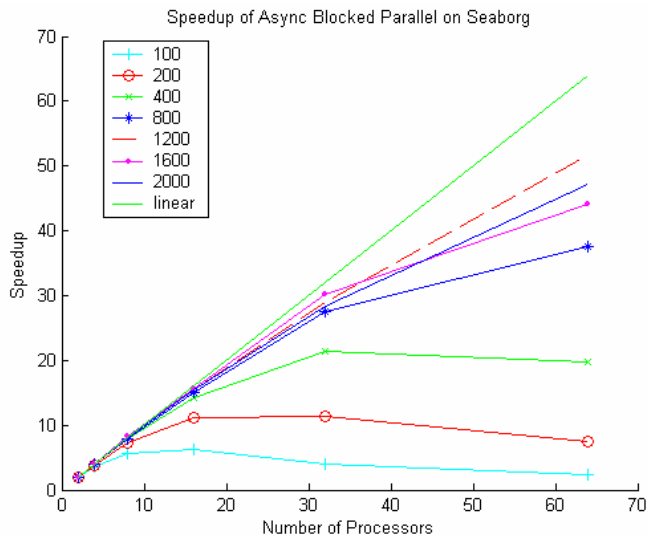
- ▶ Speedup $S = T(1)/T(p)$.
- ▶ Efficiency $E = T(1)/pT(p)$.
- ▶ Scalability: what to plot?
 - ▶ constant flops.
 - ▶ constant memory.

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Note too useful if this was the only type of plots. . .



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Dynamic Programming

Need to compute $T(n, m)$ using smaller subproblems. How to pack a knapsack of size n using books $1 \dots m$? Two possibilities:

- ▶ Use book m .

$$T(n, m) = T(n - W(m), m - 1) + P(m)$$

- ▶ Don't use book m .

$$T(n, m) = T(n, m - 1)$$

Don't know which choice, so compute both and take the better one.

Knapsack Problem

- ▶ Data organization. Splitting by columns, rows, or blocked?
- ▶ Data dependencies.
- ▶ Backtracking. $O(n)$ step but use more than one processor.

CITRIS

- ▶ `knap-smp` No network.
- ▶ `knap-gm` Uses Myrinet for communication.
Run from batch system (from `grapefruit`).
- ▶ `knap-udp` Uses Gigabit ethernet.

Seaborg

- ▶ `knap-smp` No network.
- ▶ `knap-lapi` Uses IBM SP switched network.
- ▶ `knap-mpi` Uses MPI (built on top of LAPI library).
- ▶ `knap-udp` Uses the standard UDP protocol.

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Submit project proposal soon!