

# **CS 4960-01: Parallel Programming**

Fall 2008

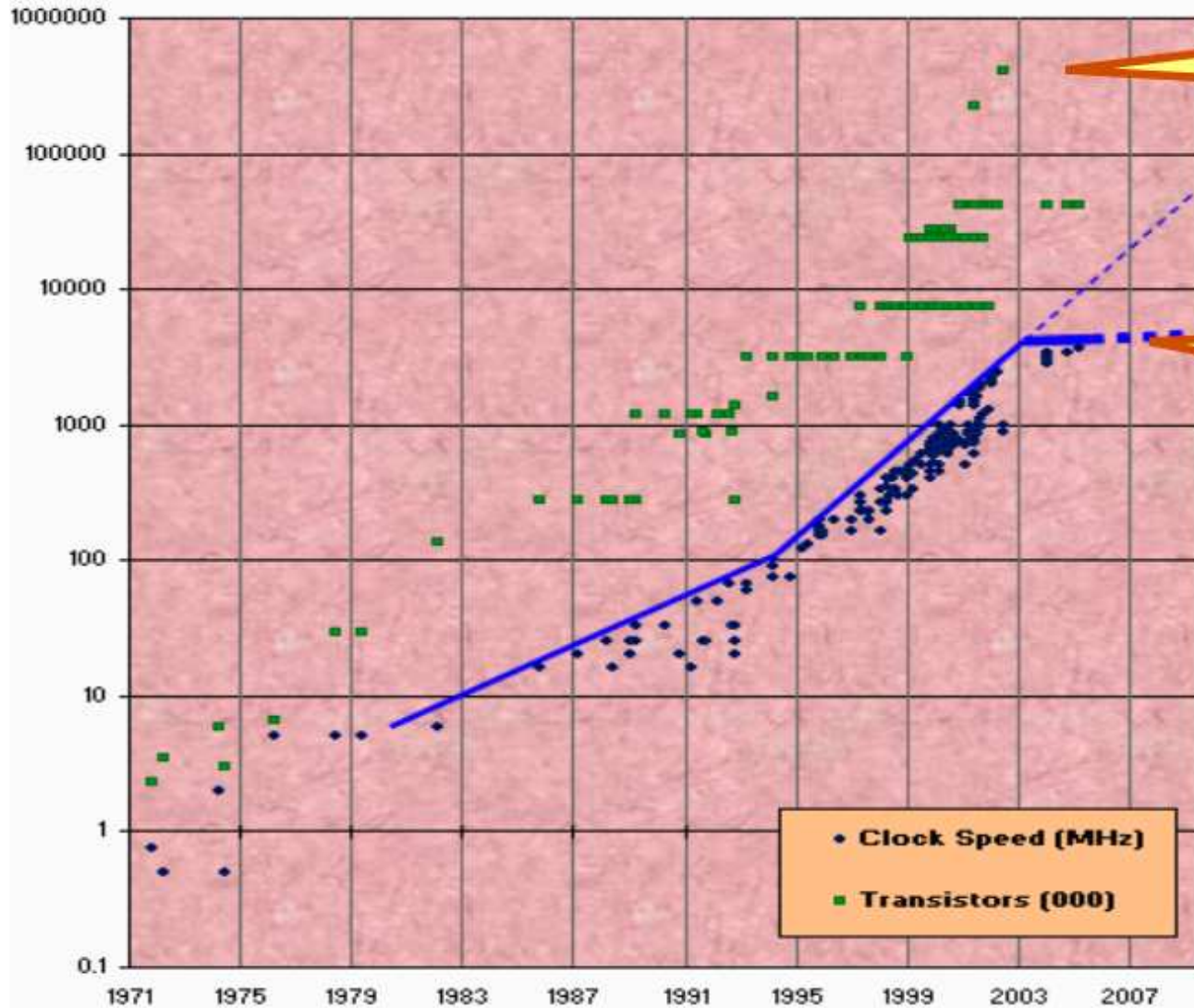
Instructor: Matthew Flatt

MWF 10:45-11:35

 **About Parallelism**

 **Course Details**

# Moore's Law



Transistor count still rising

Clock speed flattening sharply

Slide from Maurice Herlihy

*slide from Mary Hall (from Maurice Herlihy)*

# Some Terminology

- **Concurrency**: logically simultaneous
  - sometimes a good organization (e.g., GUIs)
  - shared state  $\Rightarrow$  difficult to reason about
- **Parallelism**: physically simultaneous
  - to improve performance
  - implies concurrency
- **Distributed Computing**: multiple machines
  - to improve performance or reliability
  - implies parallelism

# Automatic Parallelism

- Process-level Parallelism by OS
  - Works well
  - Limited benefit for individual applications
- Parallelizing Compilers
  - Work only in limited domains

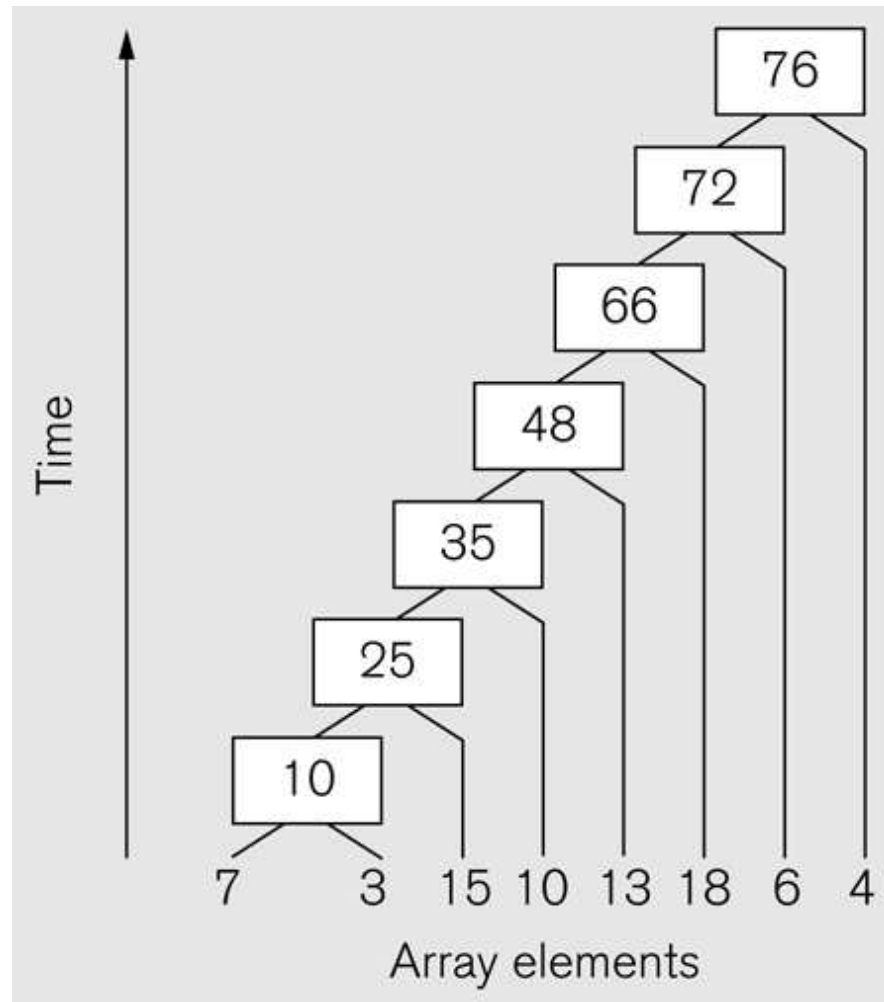
This course is about making things parallel yourself

# Sum

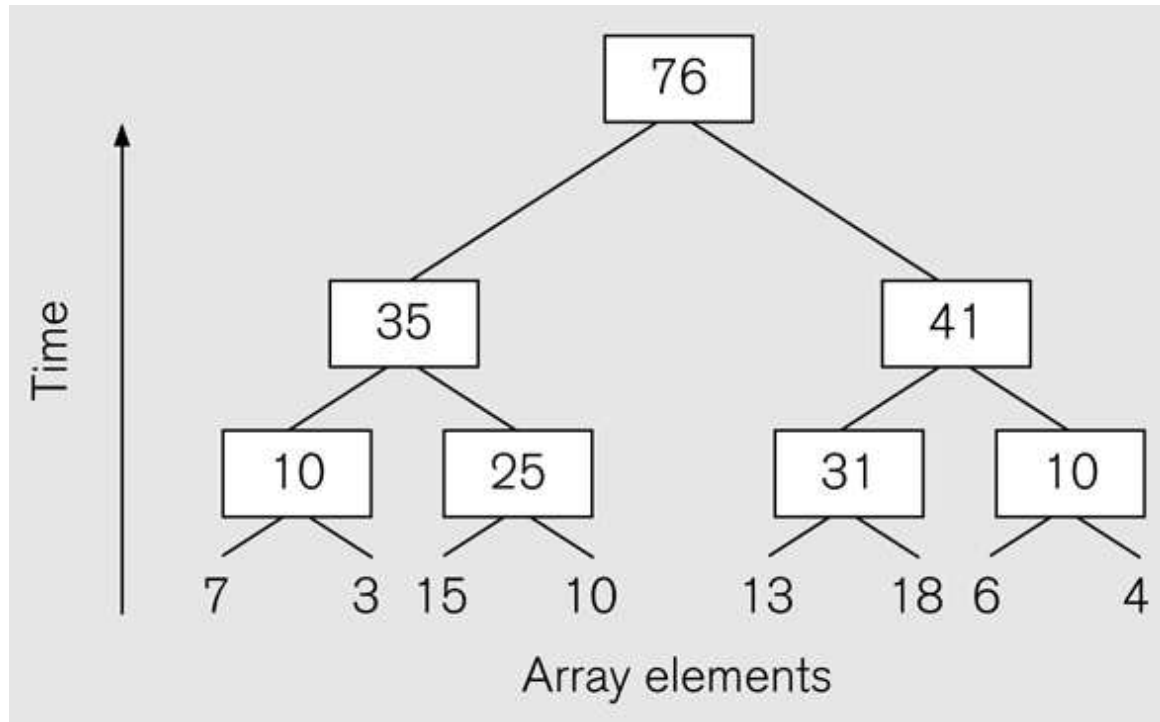
The “hello world” of parallel programming:

**add up an array of numbers**

# Sequential Sum

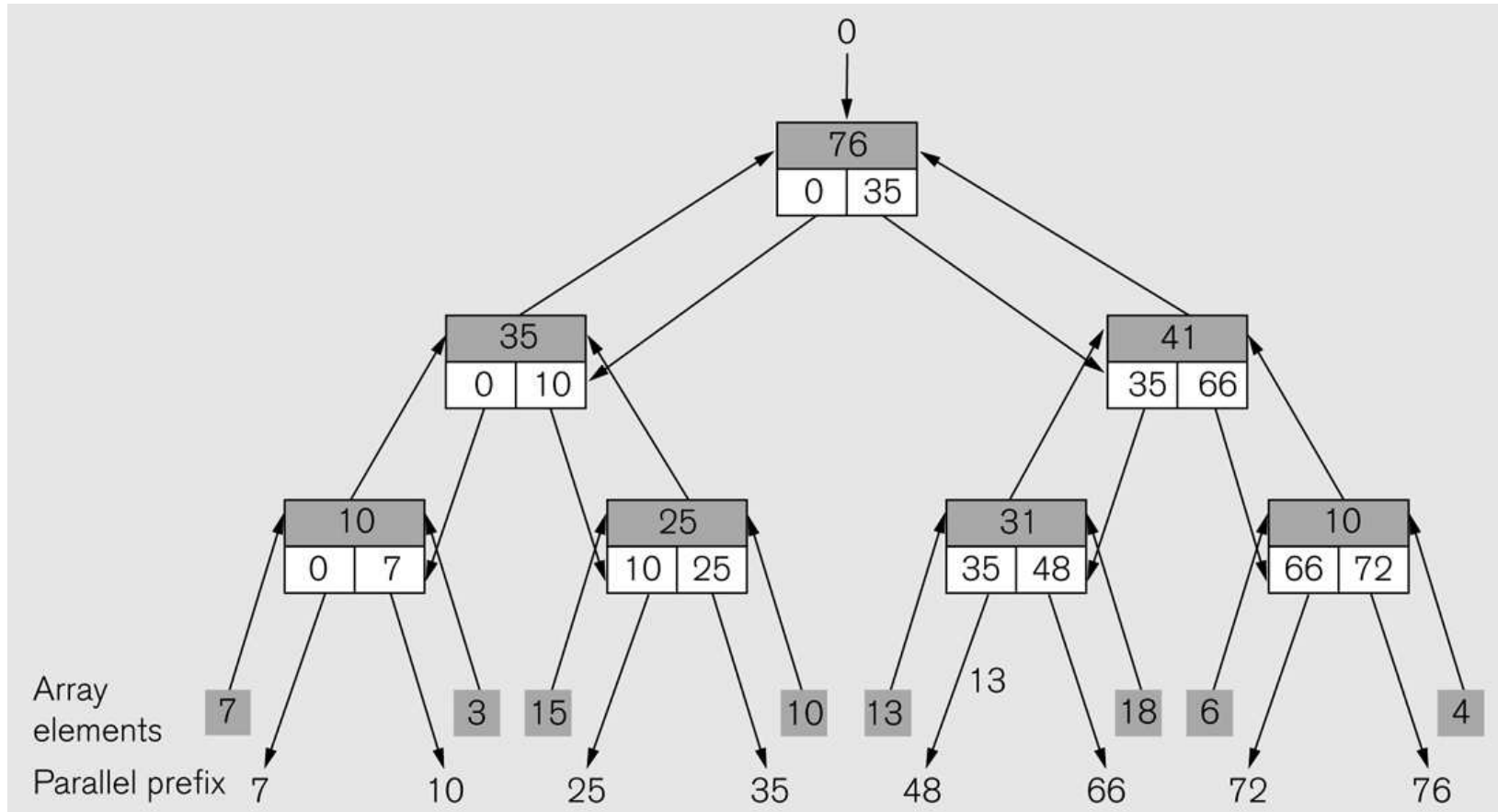


# Parallel Sum





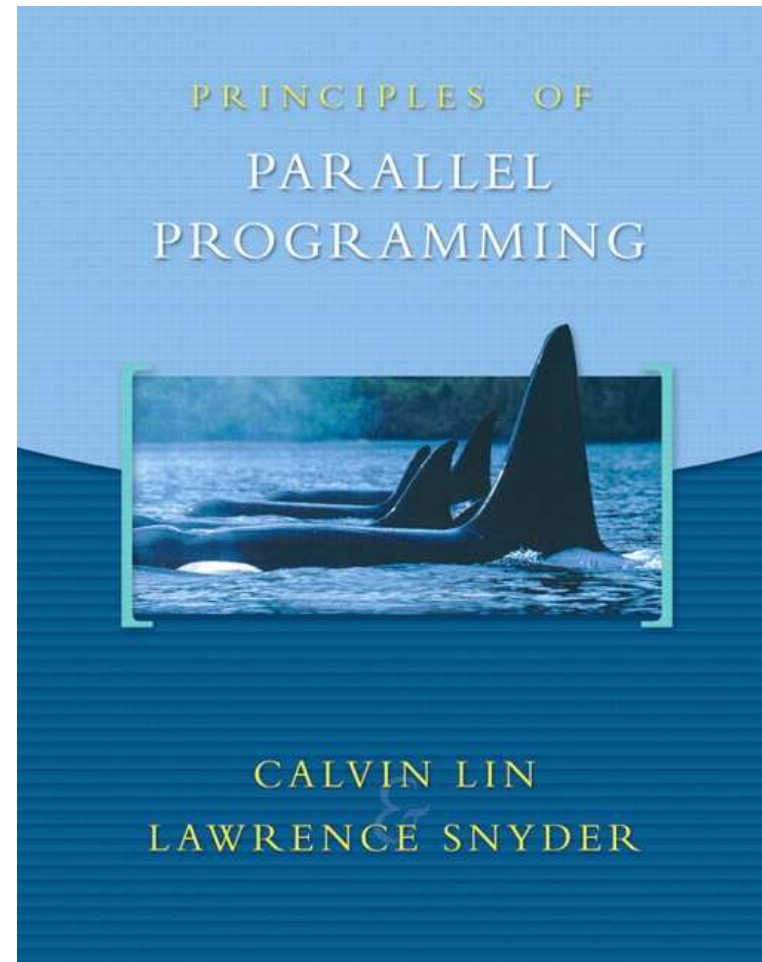
# Parallel Prefix Sum



➤ **About Parallelism**

➤ **Course Details**

# Textbook



# Programming

Expect

- Java
- C
  - Posix Threads
  - OpenMP
  - MPI
- ZPL

*and maybe more*

# In Class

		<p>Wednesday</p> <p>Lecture<sub>A</sub></p> <p>Homework<sub>A</sub> assigned</p>	<p>Thursday</p>	<p>Friday</p> <p>Lecture<sub>B</sub></p>
	...			
<p>Monday</p> <p>Student homework<sub>A</sub> presentation</p> <p>Homework<sub>A</sub> due</p>	<p>Tuesday</p>	<p>Wednesday</p> <p>Lecture<sub>B</sub></p> <p>Homework<sub>B</sub> assigned</p>	<p>...</p>	

# Grading

Homework:	40%
Class participation:	10%
Mid-term 1:	15%
Mid-term 2:	15%
Final/project:	20%

# Web Page

`http://www.eng.utah.edu/~cs4960-01/`

# Mailing List

`cs4960-01@list.eng.utah.edu`

Sign up right away!

(see course web page for info)



# Office Hours

- By appointment:

send mail to `mflatt@cs.utah.edu`

- “Regular” hours:

*TBA*