Problem Solving
Lecture 36

Readings
This Week: No new readings. Consolidate!
(Reminder: Readings are absolutely vital for learning this stuff!)

Final Exam
- Wednesday, April 15, 7pm in SRC A
  - This wasn’t a good room last year, but we’re stuck with the date, time, and room UBC assigns. 😊
  - Note: You are allowed to do scratch work on the exam paper! (But write your answer where indicated if the problem tells you to.)

Survey #3
- Ben Yu’s 3rd survey will be up on WebCT soon.
- This is an end-of-term survey, but we won’t have lectures for me to remind you.
- Keep an eye out on WebCT…

Last Lecture Today!
- Wednesday is a purely optional lecture on multi-threading.

Learning Goals
By the end of class today you will be able to…
- Apply some basic techniques to help get started when facing a new problem.
Outline

- Quickly finish our Sudoku checker.
- Convert it to a Sudoku board class.
- Use it to write a Sudoku solver!
- TA evaluation forms...

Finishing Our Sudoku Checker

- We have a 9x9 array of ints.
- Check that each row is OK – done!
- Check that each column is OK.
- Check that each zone is OK.

(Yes, there are other ways to do this, but let's stick to what we've got and get this finished!)

Building a SudokuBoard Class

- It's convenient to have a SudokuBoard class instead of just a static method to check an array:
  - A constructor that takes a 9x9 array of ints and builds the SudokuBoard object.
  - A method to check whether correct...
  - A method to check whether OK so far.
  - (A method to solve the board…)

Creating the Sudoku Solver Method

- Problem solving…
- How do you solve a Sudoku puzzle?
- There are lots of tricks to look for, but ultimately, in the worst case:
  - You have to try filling in a number.
  - See if you can continue and solve it.
  - Or else, back up and try a different number.

This is a general, very useful pattern for solving problems!
Sudoku Solver Outline

- Check the board you’re given. If it’s already illegal, return unsolvable. (Let’s return null.)
- Find an unfilled square.
  - If there are no unfilled squares, (and the board is legal,) it’s solved! Return the board.
- For each possible digit, try that digit in the unfilled square, and try to solve the puzzle.
  - If any digit works, we’ve got a solution!
  - If no digit works, there is no solution.

We can use the method itself to solve it!