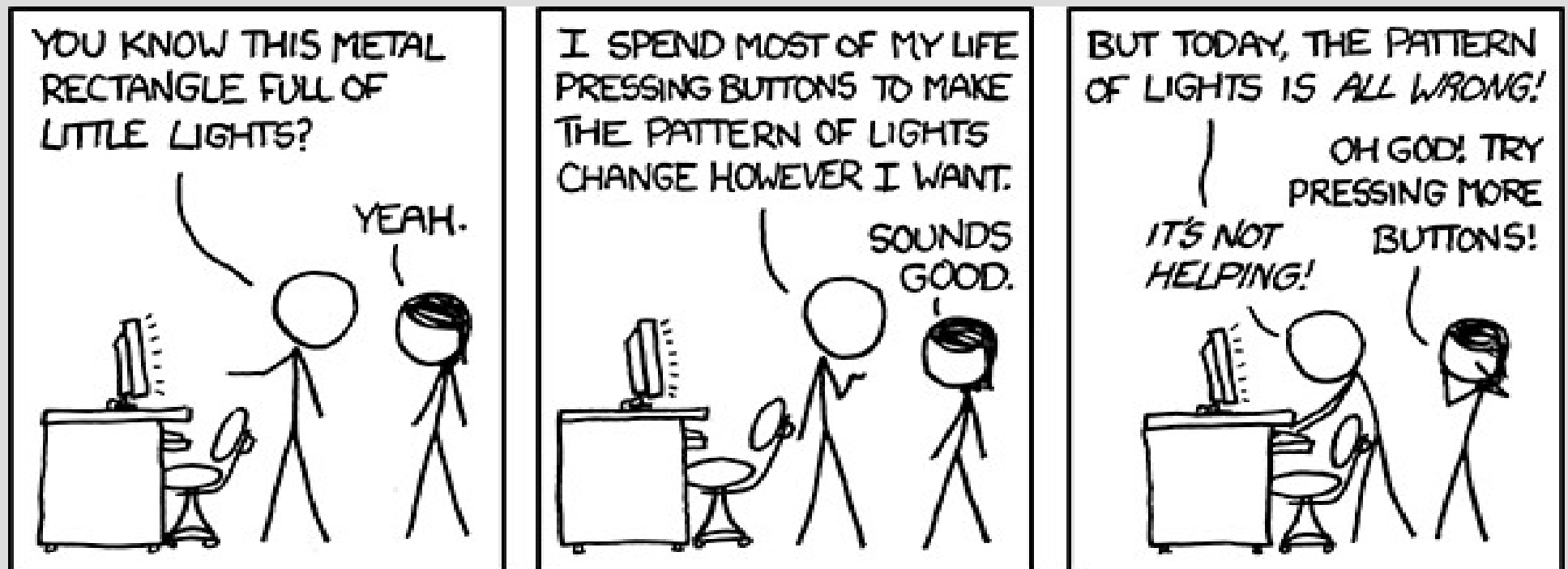


Welcome to CSci 1113

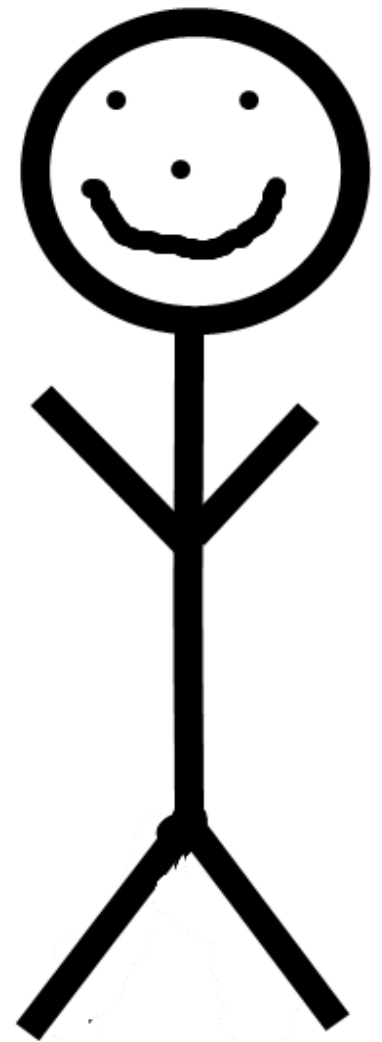
Introduction to C/C++ Programming for Scientists and Engineers



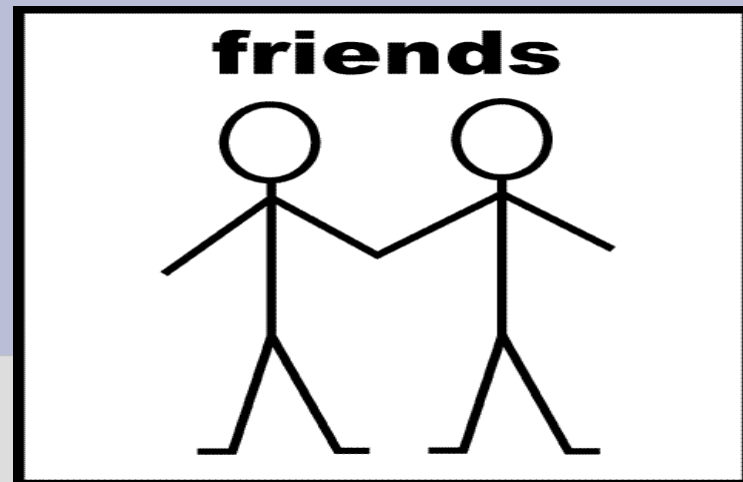
Instructor (me)

James Parker
Shepherd Laboratories 391

Primary contact:
jparker@cs.umn.edu



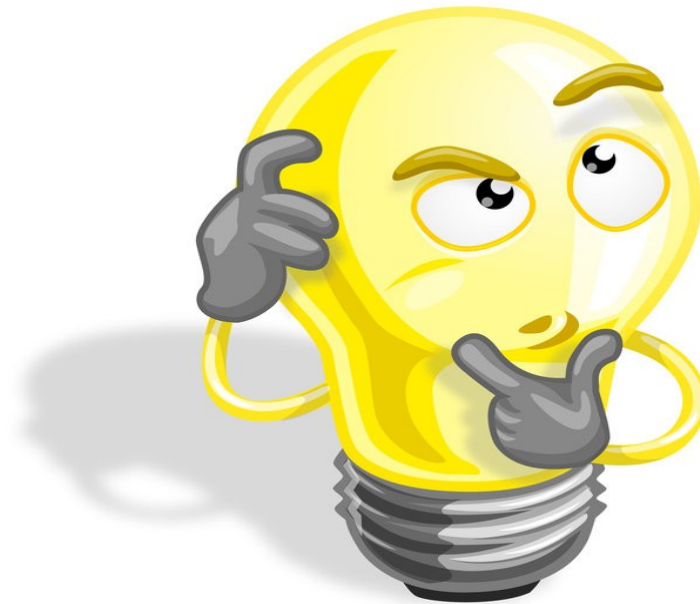
TAs



Raunak Manekar, Jiawei Mo,
Jackson Benning, Violet Chang,
Aaron Duebner, Nicholas Freiter,
Nickhil Gupta, Adam Hodapp,
Kyle Houser, Aaron Koenigsberg,
Michael Markiewicz, AJ Sakher,
Guangyu Yan, Tiannan Zhou,
Laura Ziegelski

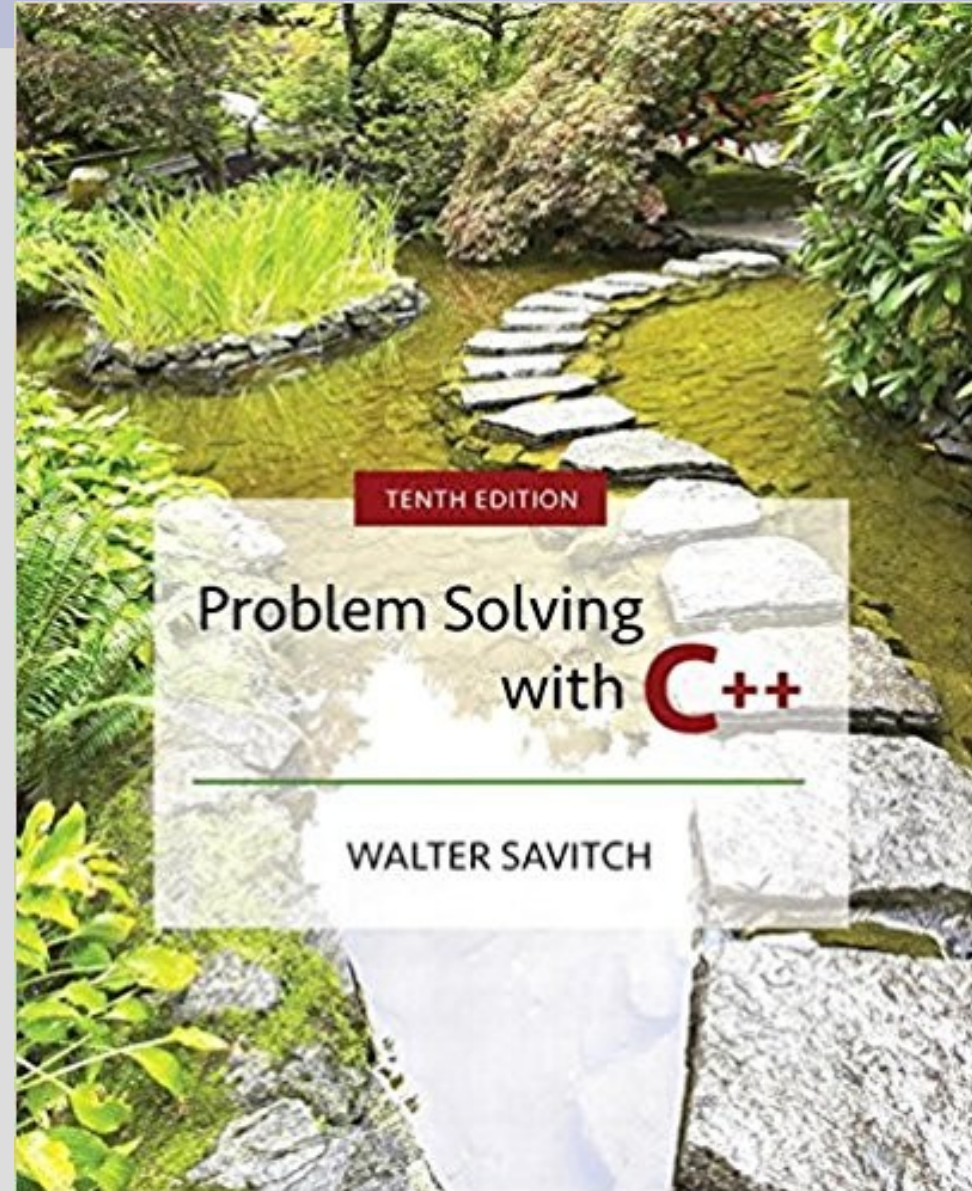
Questions?

Direct questions to:
Moodle forum discussion
jparker@cs.umn.edu



Textbook

Problem Solving
With C++,
Walter Savitch,
10th edition



CSELabs account

You need a CSELabs account to participate in labs in this course

Lab attendance is mandatory
(please make an account!)

https://cseit.umn.edu/

CSE-IT | - Mozilla Firefox

CSE-IT |

https://cseit.umn.edu

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

COLLEGE OF Science & Engineering

One Stop MyU

Search Websites and People

CSE Home | CSE Directory | Give to CSE | Student Dashboard

CSE-IT

Home | Instructional Resources | Computer Classrooms | **Forms** | About | CSE-IT Service Status | Knowledge & Help

College of Science and Engineering - Information Technology

*All the power of a CSE Linux desktop...
no matter where you are.*

CONNECT NOW!

CONNECT NOW! - 3D
if you would like to use 3D apps

VOLE Cluster Now Available in CSE Labs
Access your Linux desktop and software remotely for more convenient access to instructional resources.

TELL ME MORE

https://cseit.umn.edu/

Forms | CSE-IT - Mozilla Firefox

Forms | CSE-IT

https://cseit.umn.edu/forms

UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

COLLEGE OF Science & Engineering

One Stop MyU

Search Websites and People

CSE Home | CSE Directory | Give to CSE | Student Dashboard

CSE - IT

Home | Instructional Resources | Computer Classrooms | **Forms** | About | CSE-IT Service Status | Knowledge & Help

Home > Forms

Forms

CSE-IT Contact Info
Keller Hall - Room 1-201
Office Hours: M-F 8:00 AM - 5:00 PM
612-625-0876
csehelp@umn.edu
Or use the red phone in the labs.

- Classroom Access Form
- CSE Account Authorization Form**
- CSE Labs Classroom Reservation Form

© 2018 Regents of the University of Minnesota. All rights reserved. The University of Minnesota is an equal opportunity educator and employer. Privacy Statement

https://cseit.umn.edu/

CSE Labs Account Creation - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://www.cs.umn.edu/account-management/

Campuses: Twin Cities Crookston Duluth Morris Rochester Other Locations

myU One Stop

Search U of M Web sites Search

COLLEGE OF Science & Engineering CSE Home CSE Directory Give to CSE Student Dashboard

CSE Labs Account Creation

CSE Labs accounts no longer closing every term

If you have had a previous CSE Labs account, you do not need to reopen it every term. Accounts will now, only be closed after a year of inactivity.

Welcome to the CSE Labs Account Creation Site

Use this site to initiate your CSE Labs account. CSE Labs use is open to any student currently enrolled in the College of Science and Engineering.

If you do not know what your username is, or you are having problems see the [U of M Student Internet Account Initiation Form](#).

[Create CSE Labs Account](#)

For further information send email to operator@cseilabs.umn.edu or stop by the Systems Staff Office in Keller Hall 1-201.

For a list of our hours see [Systems Staff Contact Information and Hours](#).

Changing your Password

If you want to change your password, you will need to use the [U of M Internet Account Options web page](#).

Systems Staff Office, 1-201 Keller Hall, 200 Union St., Minneapolis, MN 55455 Phone: (612) 625-9876 Email: systems@cseilabs.umn.edu

https://www.cs.umn.edu/account-management/auth.cgi

www.cs.umn.edu

https://cseit.umn.edu/

CSE Labs Account Creation - Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://www.cs.umn.edu/account-management/

- On UNIX: df.
- On Windows: Right click on your directory and look at the properties.

Welcome to the Fall2012 CSE Labs Account Creation Form.

Use this form to initiate or change your CSE Labs account for the Fall2012 semester. CSE Labs use is open to any student currently enrolled in the College of Science and Engineering.

Please enter the following information:

- Your student email **username**.
- Your **password** for your general UMN email account. (To verify your eligibility for a CSE Labs account.)

Username: @umn.edu

Password:

If you do not know what your username is, or you are having problems see the [U of M Student Internet Account Initiation Form](#).

For further information send email to operator@cseilabs.umn.edu or stop by the Systems Staff Office in Keller Hall 1-213.

For a list of our hours see [Systems Staff Contact Information and Hours](#).

Systems Staff Operator: 1-213 Keller Hall, 200 Union St, Minneapolis, MN 55455 **Phone:** (612) 625-0876 **Email:** operator@cseilabs.umn.edu

© 2011 Regents of the University of Minnesota. All rights reserved. Twin Cities Campus: [Parking & Transportation](#) [Maps & Directions](#)

Done www.cs.umn.edu

CSELabs account

CSELabs account used in lab
(first lab ensures account working)

Register ASAP

Problems?

Bug operator@cselabs.umn.edu

Class website

www.cs.umn.edu/academics/classes

Or google “umn.edu csci class”

Syllabus, schedule, other goodies

Moodle page will have grades and homework submissions

Class website

Moodle also has a link to the website:

OF MINNESOTA

Introduction to C/C++ Programming for Scientists and Engineers (sec 001, 010) Fall 2018

moodle 3.2

CSCI1113_001F18

Turn editing on

- Announcements
- Moodle Resources and Self-Help Guides
- Questions/Discussion
- Main webpage < ---- (click me)**

Office Hours

1113 Office Hours

Today | Sep 2 - 8, 2018 | Print | Week | Month | Agenda

| | Sun 9/2 | Mon 9/3 | Tue 9/4 | Wed 9/5 | Thu 9/6 | Fri 9/7 | Sat 9/8 |
|------|---------|---------|---------|---------|---------|---------|---------|
| 7am | | | | | | | |
| 8am | | | | | | | |
| 9am | | | | | | | |
| 10am | | | | | | | |

www.cs.umn.edu



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

myU >

One Stop >

Search U of M Web Sites

Search

COLLEGE OF
Science & Engineering

[CSE Home](#) | [CSE Directory](#) | [Give to CSE](#) | [Student Dashboard](#)

[Home](#)

[Office Hours](#)

[Syllabus](#)

[Moodle \(grades and
hw submission\)](#)

CSci 1113: C++ Programming

Schedule*

This is an approximate schedule. It will be updated as the class progresses.

| Week | Week Of | Topics | Lecture Materials (001) | Lecture Materials (010) | Readings | Exams | Lab | Due |
|------|----------|---|-------------------------|-------------------------|--------------------|---|---|--|
| 1 | Sept. 4 | Introduction, computers, algorithms, programs, compilers | | slides | Ch. 1 | | Unix tutorial (no lab this week) | |
| 2 | Sept. 10 | Variables, expressions, assignment, console I/O, predefined functions | | | Ch. 2, Section 4.2 | | Lab 1: Basic C++ programs | |
| 3 | Sept. 17 | Selection, boolean expressions, if-else, multiway-if, switch | | | Sections 3.1, 3.2 | | Lab 2: Sequence and selection | HW 0, Wednesday Sept. 19 at 11:00 P.M. |
| 4 | Sept. 24 | Iteration, while loops, for loops, loop paradigms | | | Sections 3.3, 3.4 | | Lab 3: Iteration | HW 1, Wednesday Sept. 26 at 11:00 P.M. |
| 5 | Oct. 1 | User-defined functions, procedural abstractions | 10/3--Quiz | 10/2--Quiz | Ch. 4, 5 | Quiz Covers Ch 1-3.2 (up to week 3: if- | Lab 4: User defined functions | HW 2, Wednesday Oct. 3 at 11:00 P.M. |

Syllabus

15% Labs

30% Homework (due Wednesdays)

5% Quiz (Oct. 3)

10% Midterm 1 (Oct. 17)

15% Midterm 2 (Nov. 21)

25% Final (Monday Dec. 17, 8:00am
to 10:00am in this room)

Syllabus

Each week there will be either a homework due or a test

Homework is due Wednesdays at 11:00 P.M. on Moodle

Late homework is not accepted, but we will drop the lowest one

Syllabus

Labs can be checked off up until a week after the lab

Homework must be coded individually

Don't cheat

Really... don't cheat

Homework

Homework will be both a creative and problem solving endeavor:

Lego example

Build a castle with:

- 4 walls enclosing

- Door

- At least one tower (higher than wall)



Homev



Exams

All exams will be open book/notes
Electronic notes okay
(no memorization)

You **cannot**:

1. Use the internet (no typing)
2. Compile/run programs
3. Talk to or copy from others

Syllabus

Grading scale:

93% A

90% A-

87% B+

83% B

80% B-

77% C+

73% C

70% C-

67% D+

60% D

Below F

Schedule

Ch. 1: Introduction, Programs, Compilers

Ch. 2: Input/Output, Data, Expressions

Ch. 3: Control Flow (if and loops)

Ch. 4, 5: Functions (return values)

Ch. 6: File I/O

Ch. 7, 8: Arrays and Strings

Ch. 9: Pointers and Dynamic Arrays

Ch. 10&11: Classes and Operator Overloading

Ch. 14&15: Recursion & Inheritance

Syllabus

Any questions?

What can I program?

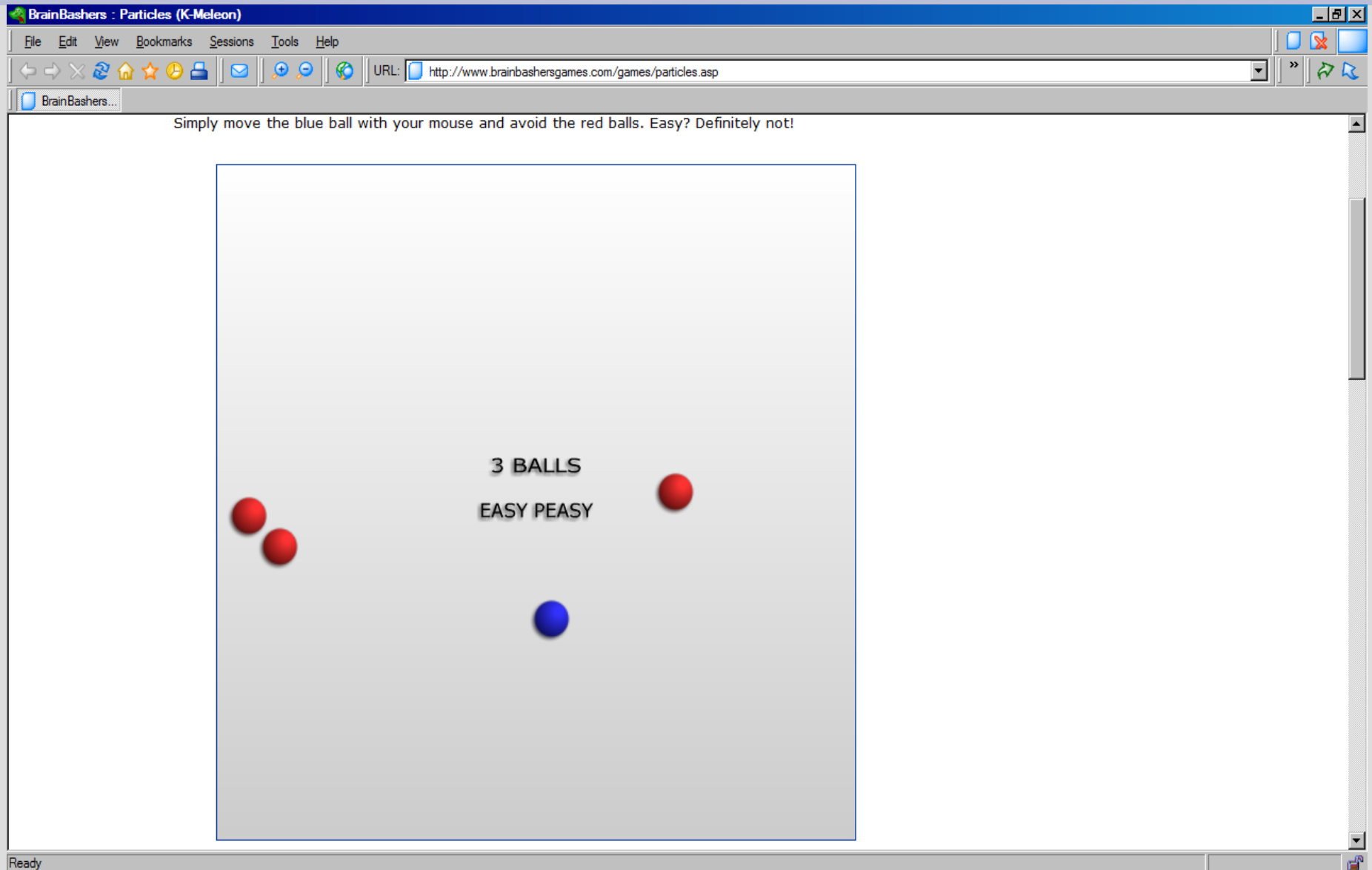
If you can think of an explicit process (of simple steps) to solve your problem, then it can be programmed.

Banana Nut Bread

Directions

1. Preheat the oven to 350°F (175°C).
2. Mix butter into the mashed bananas in a large mixing bowl.
3. Mix in the sugar, egg, and vanilla.
4. Sprinkle the baking soda and salt over the mixture and mix in.
5. Add the flour and nuts last, mix.
6. Pour mixture into a buttered 4x8 inch loaf pan.
7. Bake for 1 hour. Cool on a rack.

Repetitive tasks



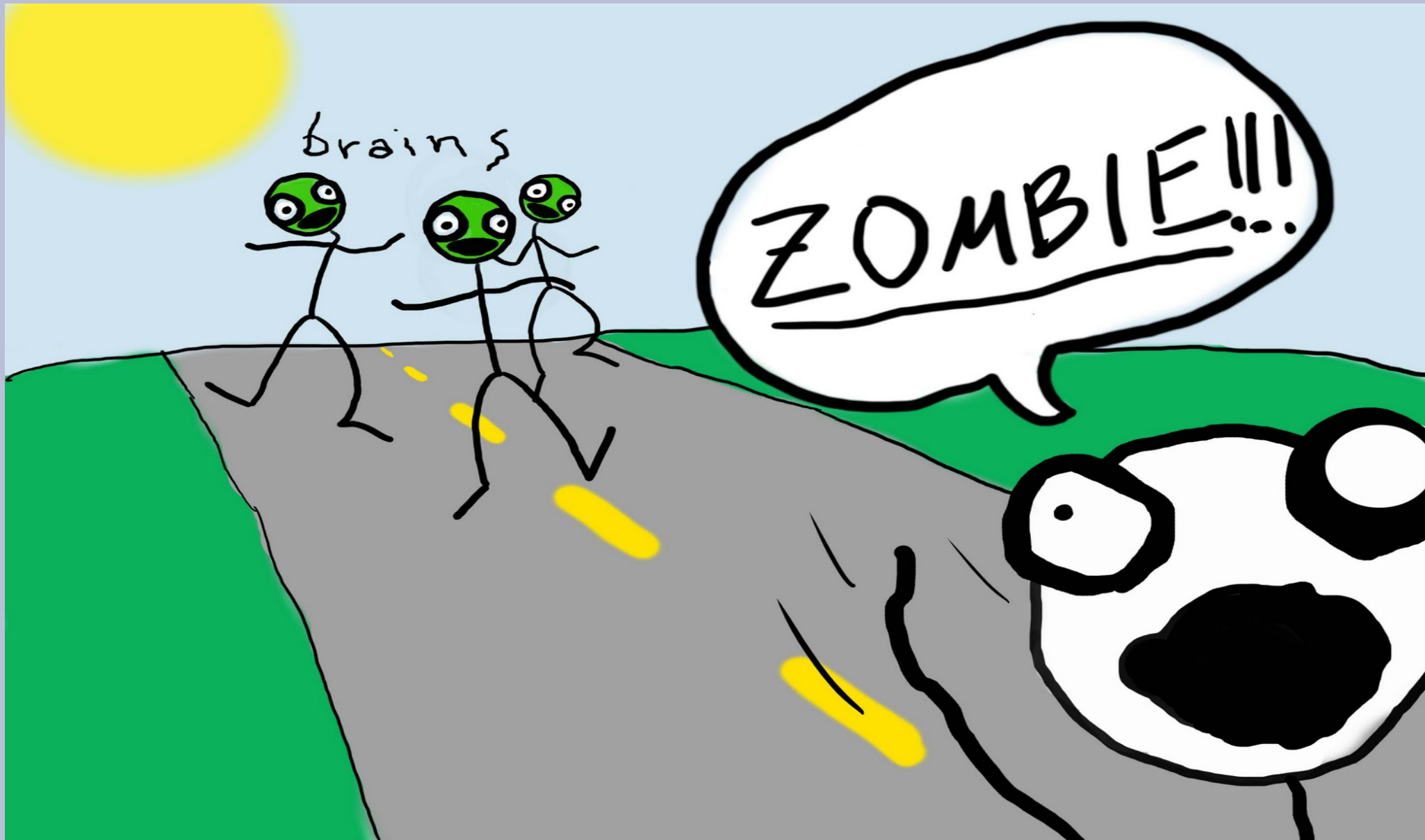
ATMs

How do you get change for \$18.26 with the least amount of bills and coins?

Repetitive tasks

If you feel like a mindless zombie when you do it a lot, you can probably program it.

Repetitive tasks



Repetitive tasks

names.csv - OpenOffice.org Calc

File Edit View Insert Format Tools Data Window Help

Find

A1:A21 Tommy V. Guzman

| | A | B | C | D | E | F |
|----|----------------------|-------------------------|------------------------------|-------------|---------------------|-----------------------|
| 1 | Carlos L. Arney | 1040 Morgan Street | Pensacola, FL 32507 | Username: | Herch1955 | Password: |
| 2 | Randall K. Blackwell | 2205 Richison Drive | Canyon Creek, MT 59633 | Phone: | 406-368-2915 | Mother's Maiden name: |
| 3 | Ann F. Gibson | 294 Briercliff Road | Corona, NY 11368 | MasterCard: | 5175 0562 3099 3057 | Expires: |
| 4 | David J. Woodhouse | 2620 Rebecca Street | Schaumburg, IL 60173 | Phone: | 847-764-3769 | Username: |
| 5 | Michael J. Smith | 1029 Timber Oak Drive | Amarillo, TX 79106 | Phone: | 806-217-2186 | Username: |
| 6 | Mary J. Rasmussen | 2519 Central Avenue | Jersey City, NJ 07304 | Phone: | 201-407-0629 | Username: |
| 7 | Martin M. Hughes | 2327 Cedar Lane | West Roxbury, MA 02132 | Phone: | 617-620-3407 | Username: |
| 8 | Melanie D. Mouzon | 458 Pursglove Court | Dayton, OH 45410 | Phone: | 937-253-3788 | Username: |
| 9 | Christine S. Bonin | 2934 Hillview Drive | Columbus, GA 31901 | Phone: | 706-887-2499 | Username: |
| 10 | William G. Holland | 2528 Hart Ridge Road | Saginaw, MI 48607 | Phone: | 989-293-0797 | Username: |
| 11 | Doyle B. Dye | 3644 Boone Street | Vancouver, WA 98660 | Phone: | 360-991-4150 | Username: |
| 12 | Steve R. Burkey | 3672 Coffman Alley | Owensboro, KY 42301 | Phone: | 270-714-9200 | Username: |
| 13 | Christine M. Frazier | 2723 Glory Road | Nashville, TN 37210 | Phone: | 931-671-8923 | Username: |
| 14 | Nell P. Granberry | 888 Cherry Tree Drive | Green Cove Springs, FL 32043 | Phone: | 904-284-1680 | Username: |
| 15 | Madeleine D. Daniel | 3932 Kelly Street | China Grove, NC 28023 | Phone: | 704-855-0612 | Username: |
| 16 | Lillie D. Callender | 1593 Brannon Avenue | Jacksonville, FL 32218 | Phone: | 904-741-4642 | Username: |
| 17 | Shoshana J. Falls | 4475 Sycamore Lake Road | Appleton, WI 54911 | Phone: | 920-401-7907 | Username: |
| 18 | Cynthia H. Morgan | 1901 Larry Street | Waukesha, WI 53188 | Phone: | 414-837-2559 | Username: |
| 19 | Dorothy R. Reed | 1748 Braxton Street | Momence, IL 60954 | Phone: | 815-472-6115 | Username: |
| 20 | Tyler M. Puleo | 2373 Carriage Lane | Toledo, OH 43609 | Phone: | 567-472-8284 | Username: |
| 21 | Tommy V. Guzman | 370 Fairfax Drive | Fullerton, CA 93632 | Phone: | 909-262-7466 | Username: |

Sheet 1

Sheet 1 / 1 Default STD Sum=0 100%

Auto leveling?



Software vs Hardware

Software - the more intangible
code on a computer



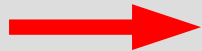
Hardware - the physical
Parts of the computer



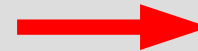
Hardware interaction



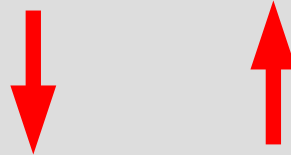
Input



CPU



Output



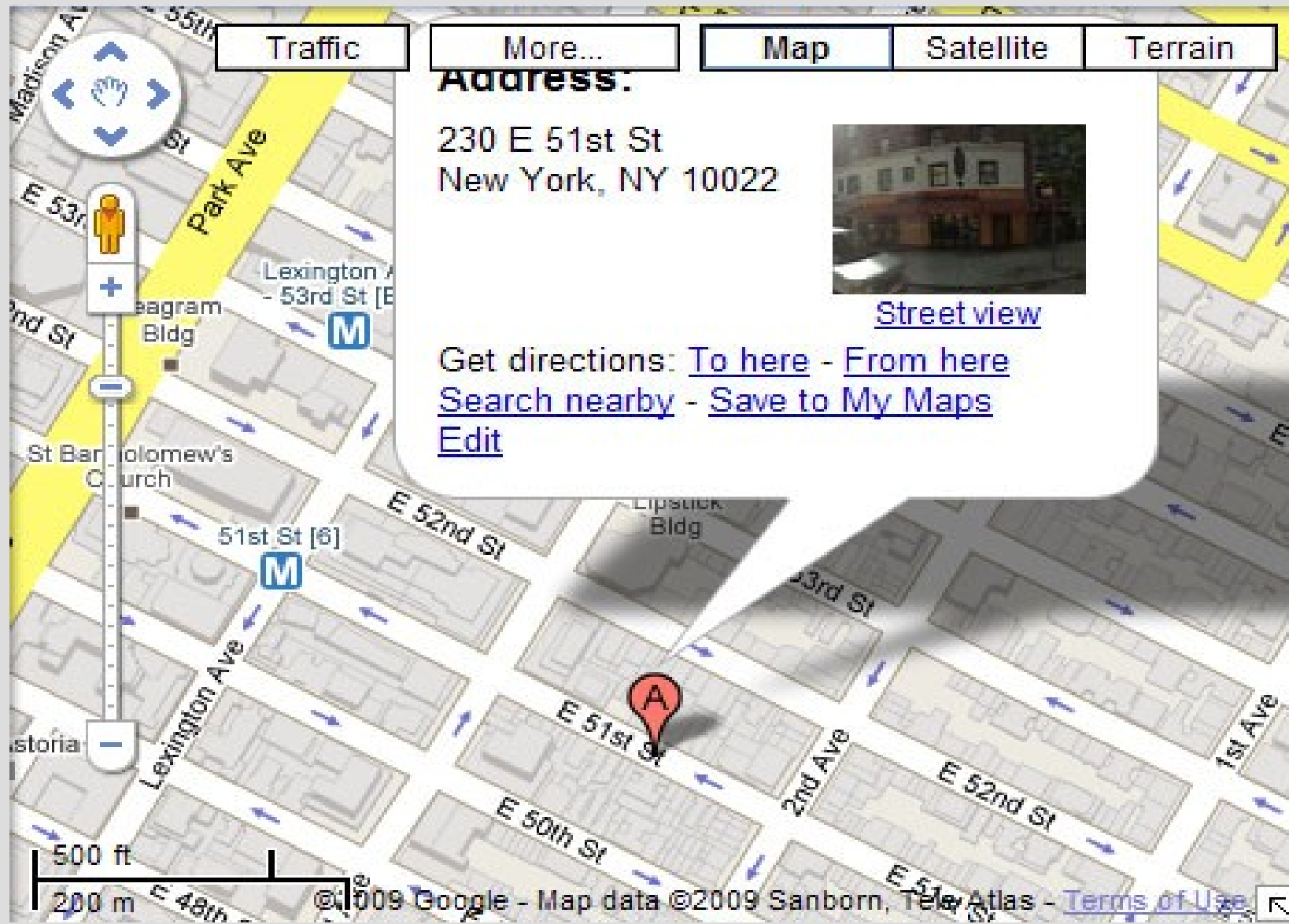
Memory

Memory addressing

Data is stored in “addresses” inside the memory

Later in this class, we will use these addresses to manipulate and share data

Memory addressing



Object oriented programming

OOP - focus on data and how they interact

To make algorithms for OOP, it is often useful to identify the data you are working with and their relationships before programming

Object oriented programming

Data for...

Banana nut bread?

ATM?

Ball game?

Object oriented programming

Data for...

Banana nut bread? Ingredients

ATM?

Ball game?

Object oriented programming

Data for...

Banana nut bread? Ingredients

ATM? Dollars & coins

Ball game?

Object oriented programming

Data for...

Banana nut bread? Ingredients

ATM? Dollars & coins

Ball game? Balls & mouse

Object oriented programming

Data for...

Banana nut bread? Ingredients

ATM? Dollars & coins

Ball game? ~~Balls & mouse~~

Lots of pixels (tiny color dots)