What is CS?

And what is it not?

Ten Reasons to Study Computer Science

1. Computing is part of everything we do
2. Allows you to solve complex problems
3. Make a positive difference in the world
4. Many high-paying careers
5. Computing jobs are in great demand

Ten Reasons to Study Computer Science

6. CS helps with any career
7. Opportunity to be creative and innovative
8. Work in teams or solo
9. Part of a well-rounded academic base
10. No limits to what the future may hold

What is Computer Science

- **Grandma definition:**

  Computer Science studies solving problems using computers

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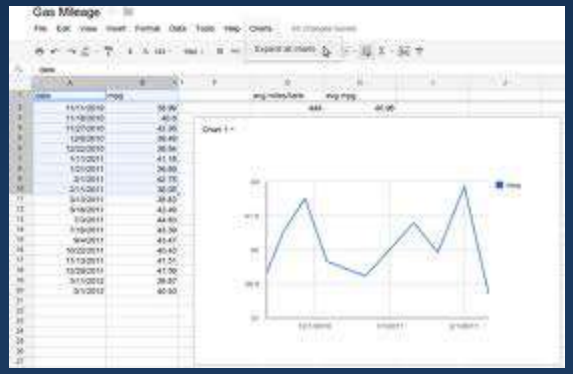
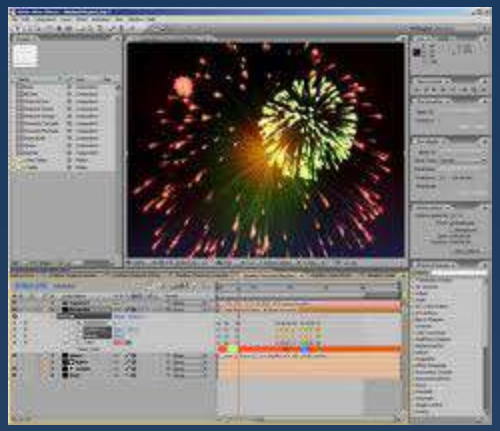
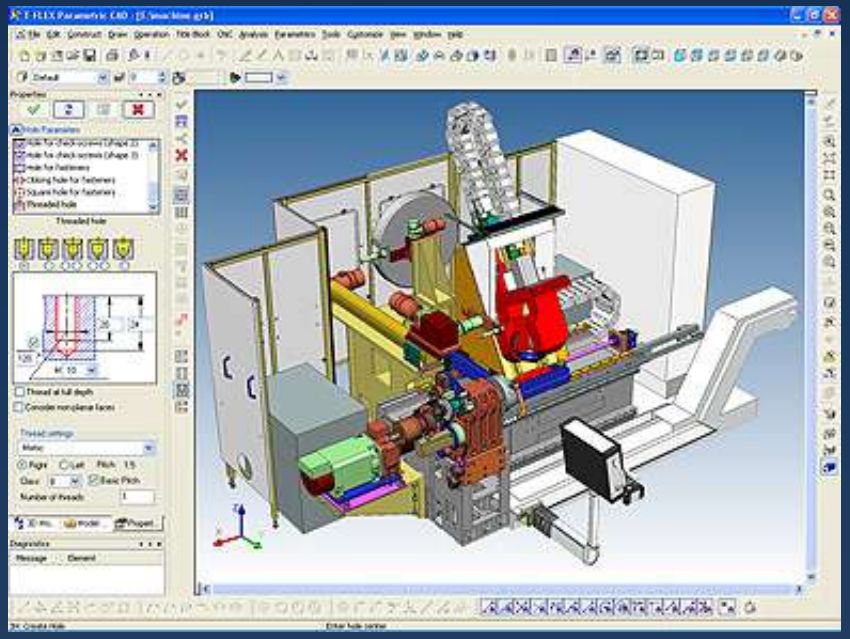
What Computer Science Isn't

- Digital Literacy / Using computer applications

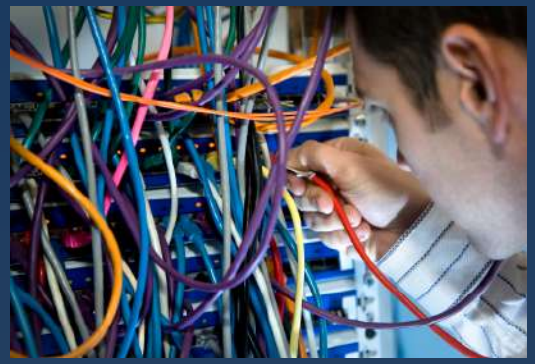






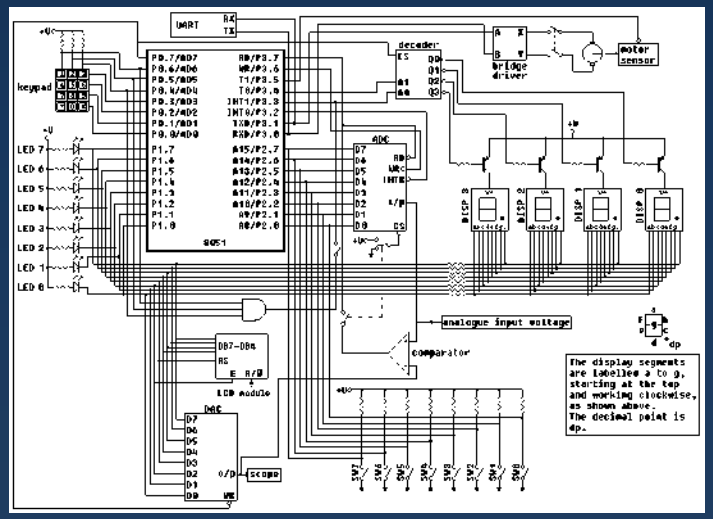
What Computer Science Isn't

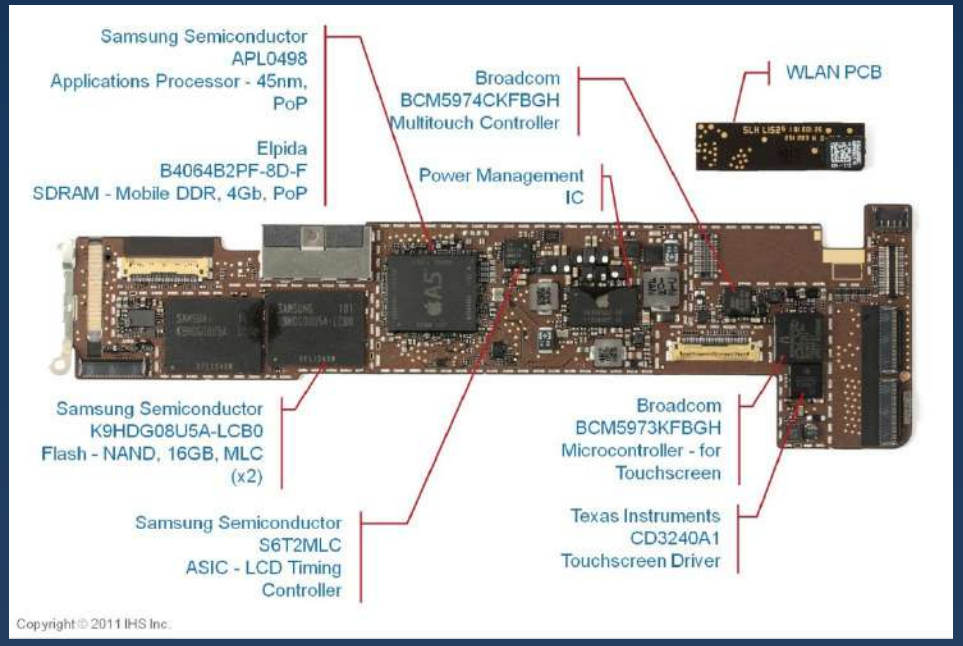
- Building & configuring computer systems
  - *Information Technology*



What Computer Science Isn't

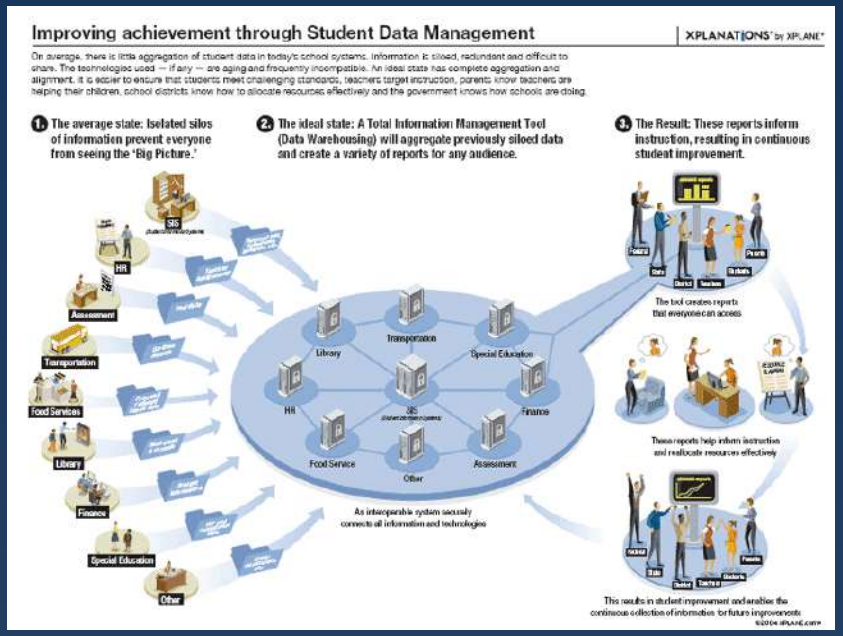
- Designing computer electronics
  - *Computer Engineering*





What Computer Science Isn't

- Deciding how to use computer systems
  - *Information Systems*

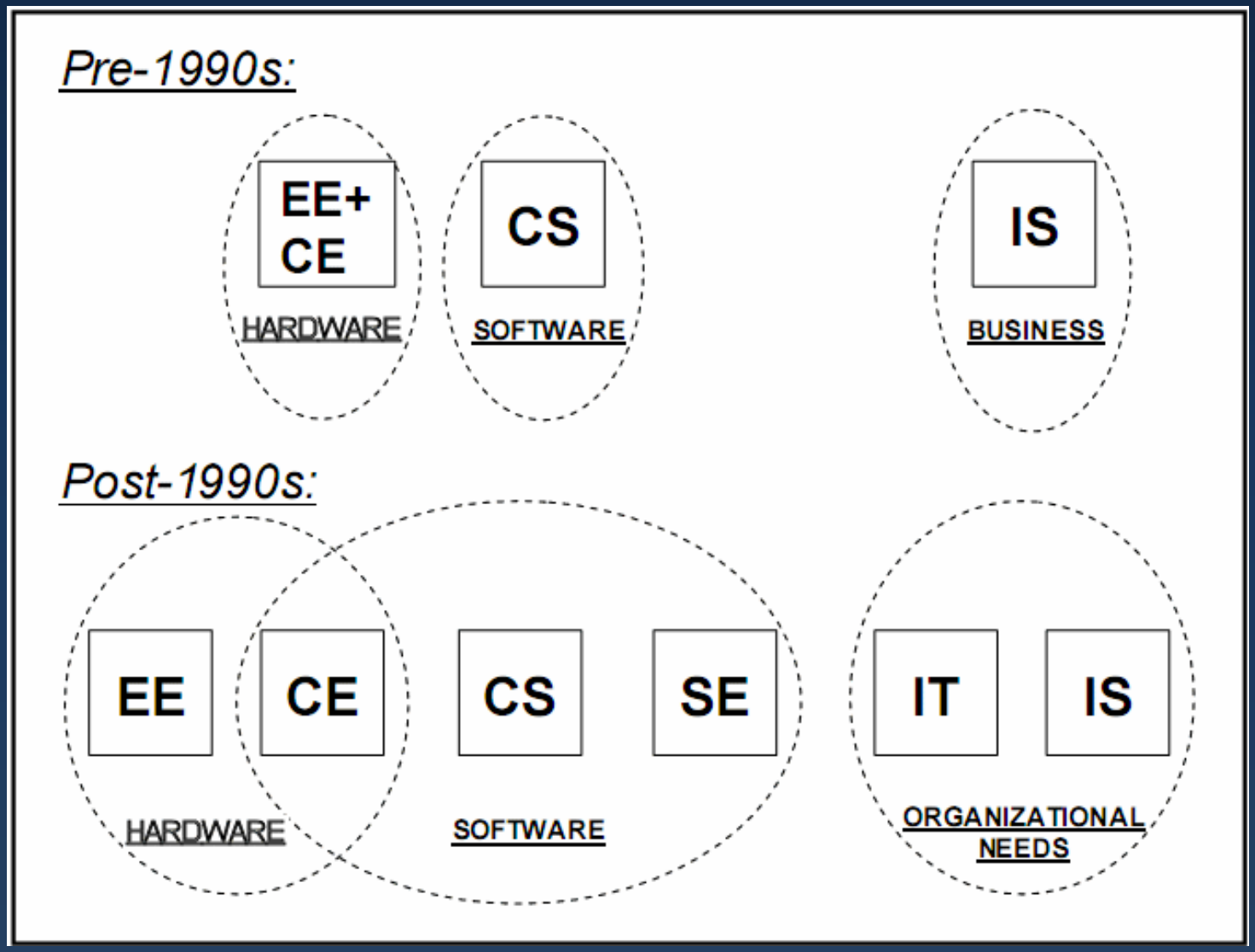


What Computer Science Isn't

- Computer programming
  - *Software Engineering*

```
private void btnGoActionPerformed(java.awt.event.ActionEvent evt) {
    // calcaulte Fibonacci sequence up to value provided
    int intValue, intCurrent, intLast, intPrior;
    String strValue, strResult;
    // initialize the values
    intPrior = 0;
    intLast = 1;
    intCurrent = intPrior + intLast;
    strResult = "<html>Fibonacci Numbers<br />" +
            intPrior + " " + intLast;
    // get the data
    strValue = txtValue.getText();
    intValue = Integer.parseInt(strValue);
    // do the work
    while ( intCurrent <= intValue ) {
        strResult += " " + intCurrent;
        intPrior = intLast;
        intLast = intCurrent;
        intCurrent = intPrior + intLast;
    }
    // display the result
    lblResult.setText(strResult + "</html>");
}
```

Computer Related Fields



What Computer Science Isn't

- Digital Literacy / Using computer applications
- Building & configuring computer systems
- Designing computer electronics
- Deciding how to use computer systems
- Computer programming

What is Computer Science

- Better definition:

  Computer science is the study of what can be efficiently computed.

Computed

- Computed : solved with an algorithm

- Algorithm : Step by step instructions to solve a problem

Limits of Computation

- Not every answer can be computed

Other Undecidable Things

- Are there integer solutions to equations:

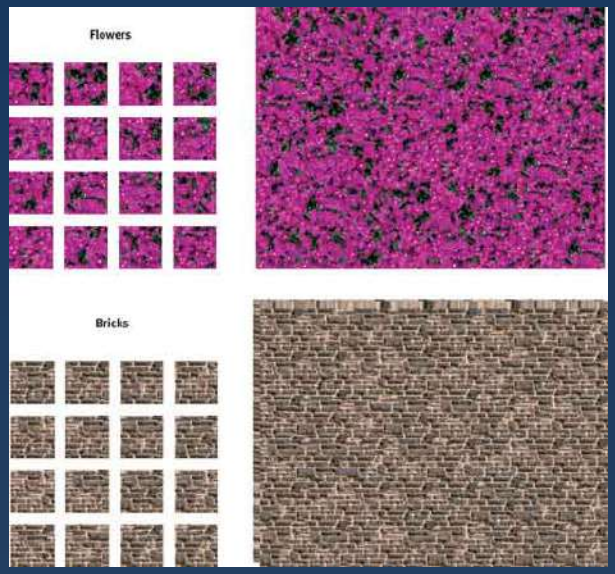
$a^2 + b^2 = c^2$: many solutions

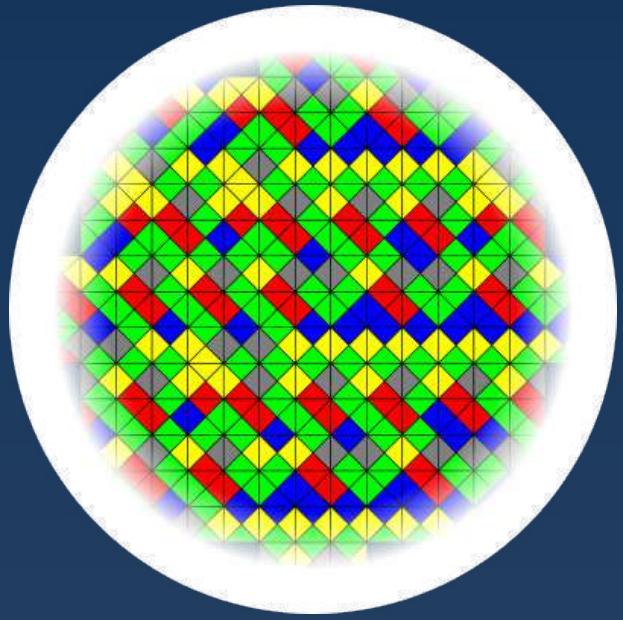
$a^3 + b^3 = c^3$: no solutions

$x^2 - 61y^2 = 1$: (226153980, 1766319049)

Other Undecidable Things

- Can we tile a plane using a given set of tiles?





What is Computer Science

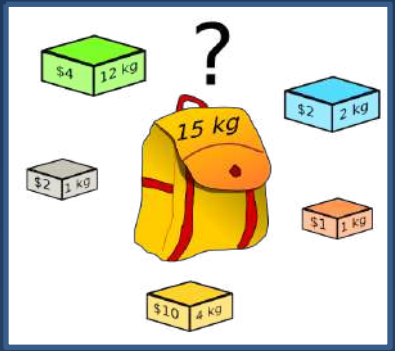
- Better definition:

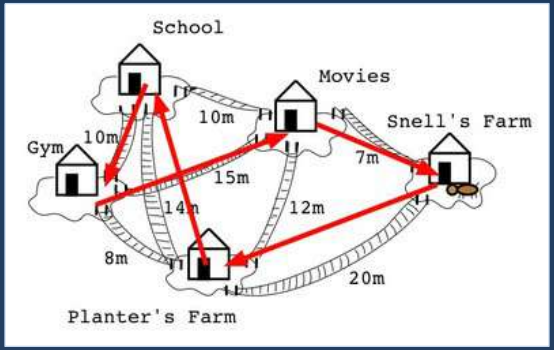
  Computer science is the study of what can be efficiently computed

Efficiency

- Practically solvable problems are ones we can compute efficiently

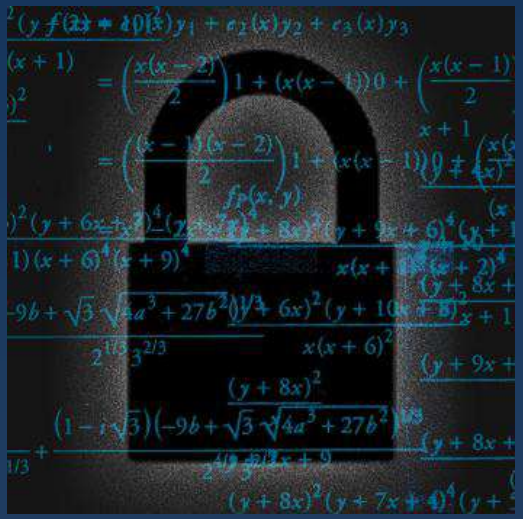
- Difficult problems
  - Knapsack problem
  - Traveling Salesman Problem





Efficiency

- Difficult can be good



Efficiency

- Different algorithms may solve the same problem at different speeds

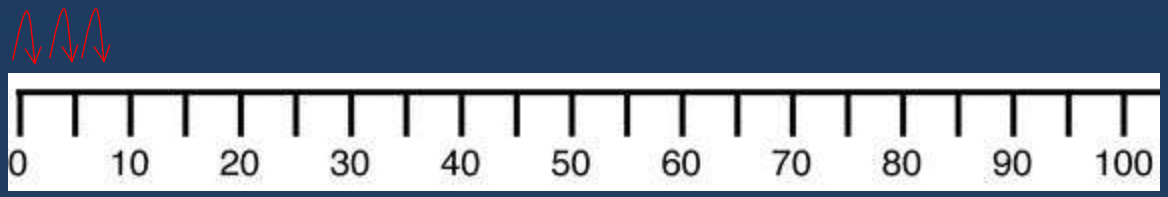
Efficiency

- I'm thinking of a number between 1 and 100
  - You try to guess it
  - I'll give too low/too high hints

Efficiency

- I'm thinking of a number between 1 and 100
  - You try to guess it
  - I'll give too low/too high hints

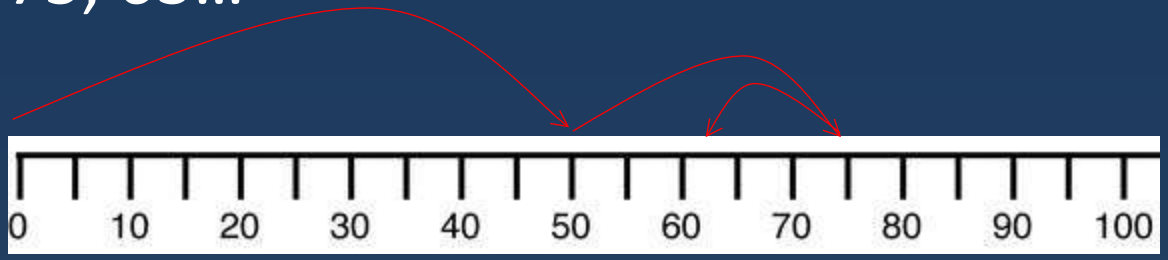
- Method #1
  - 1, 2, 3….



Efficiency

- I'm thinking of a number between 1 and 100
  - You try to guess it
  - I'll give too low/too high hints

- Method #2
  - 50, 75, 63…



Efficiency

- I'm thinking of a number between 1 and 100
  - Method #1 : max of 100 guesses
  - Method #2 : max of 7 guesses

Guess #	Possible Unchecked Numbers
0	100
1	50
2	25
3	12
4	6
5	3
6	1
7	0

Efficiency

- I'm thinking of a number between 1 and 100
  - Method #1 : max of 100 guesses
  - Method #2 : max of 7 guesses

- I'm thinking of a number between 1 and 1,000,000
  - Method #1 : max of 1,000,000 guesses
  - Method #2 : max of 20 guesses

Why Computer Science

Computer science is the study of what can be efficiently computed.

- General tools to find efficient solutions to computational problems

Why Computer Science

- General tools to find efficient solutions to computational problems
  - *Applicable in any field involving computation*