CMPT 479/886

Automated Software Analysis & Security

Nick Sumner

Much adapted from Xiangyu Zhang, Antony Hosking, Sorin Lerner, Jonathan Aldrich, Sam Blackshear

Course Website

- www.cs.sfu.ca/~wsumner/teaching/886/18/
  - Schedule
  - Policies
  - Assignments
  - Paper Suggestions

Why are you here?

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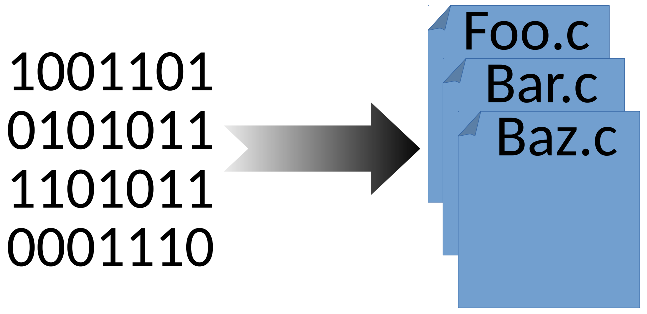

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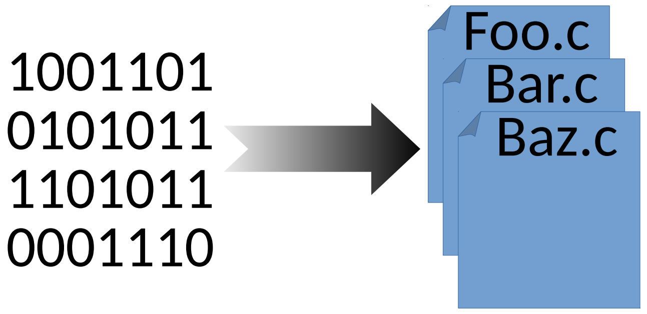

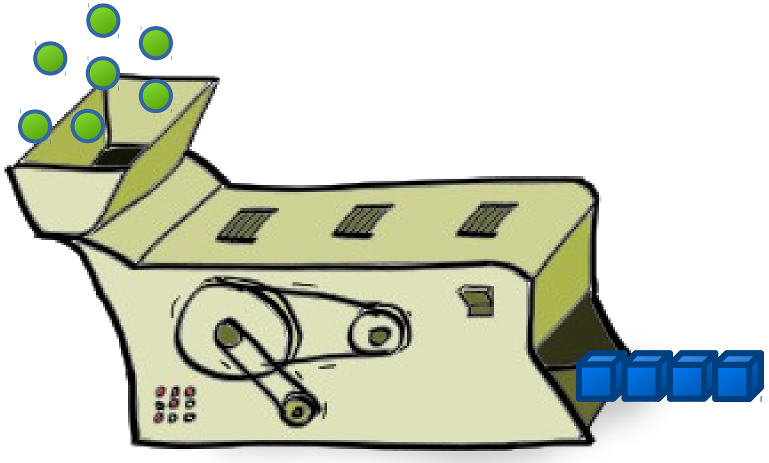

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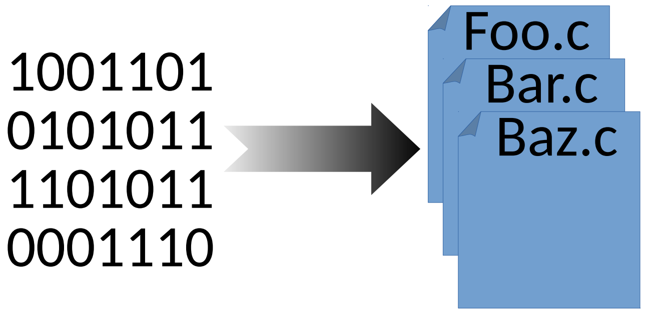

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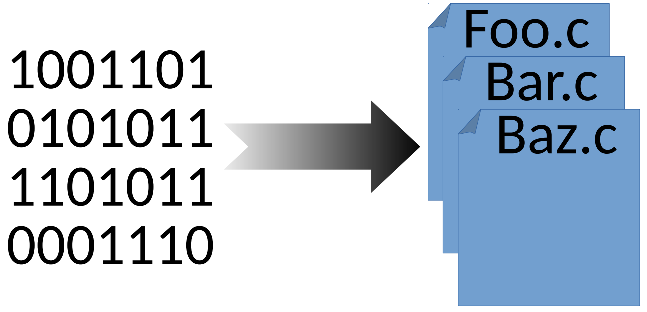

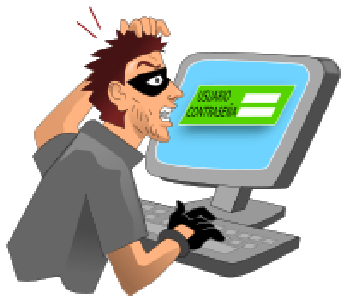

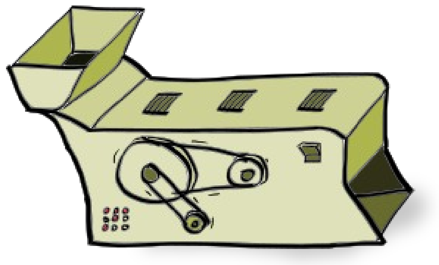

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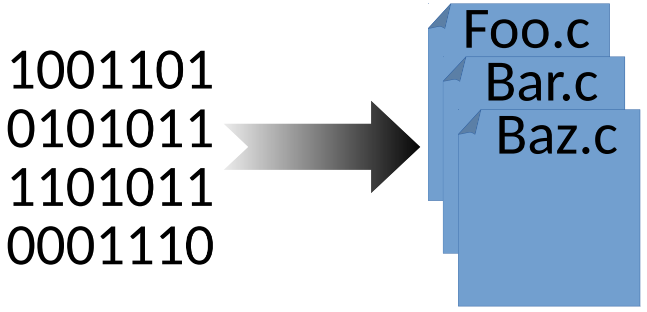

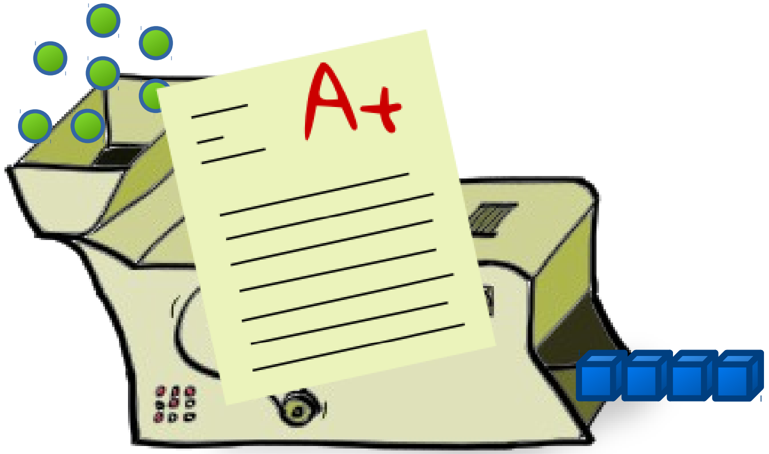

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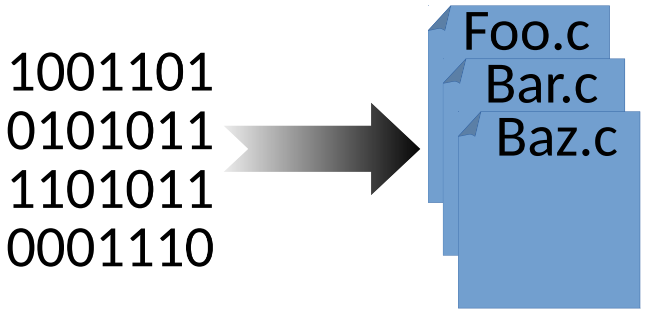

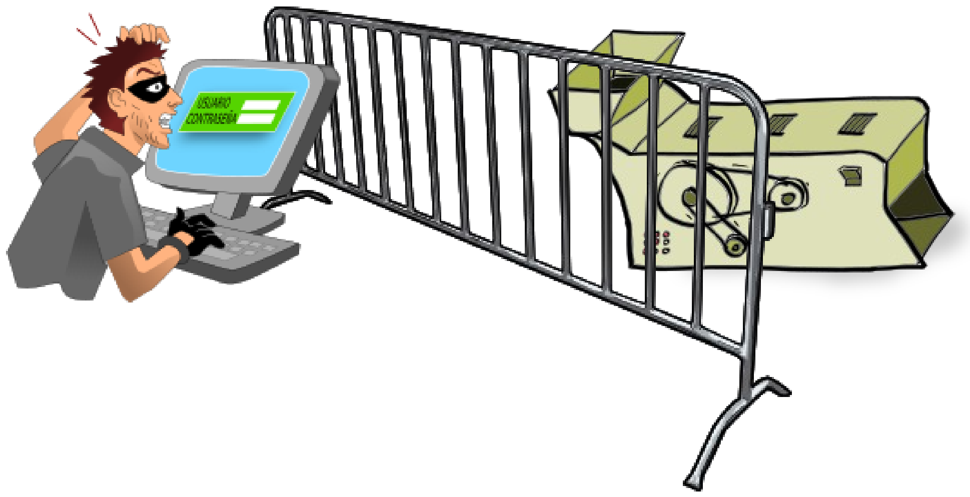

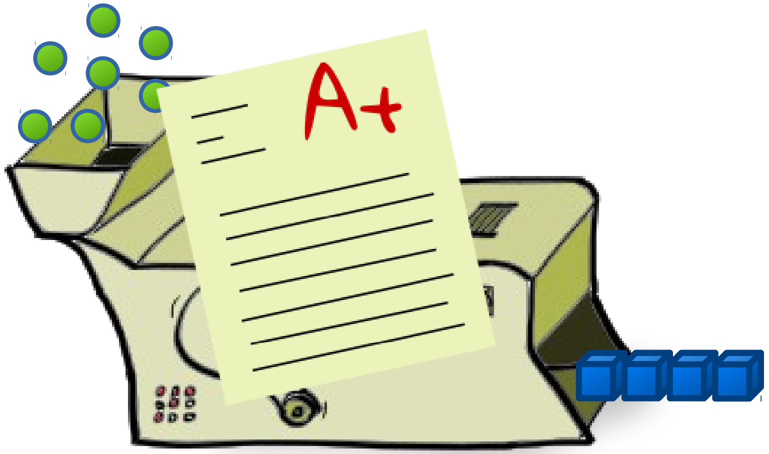

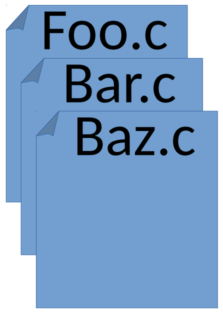

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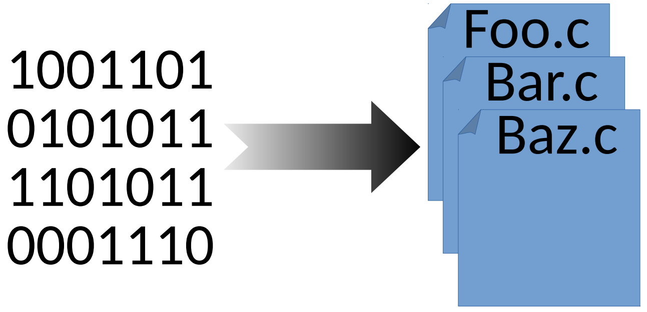

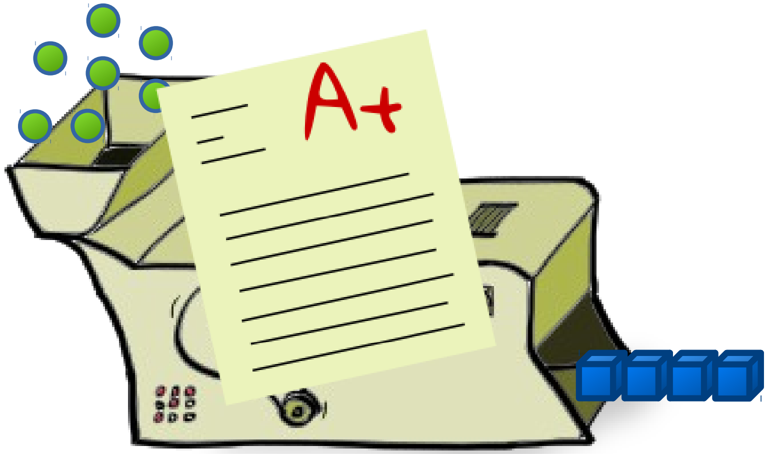

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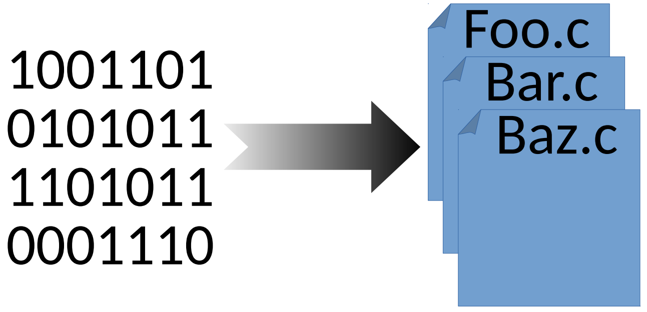

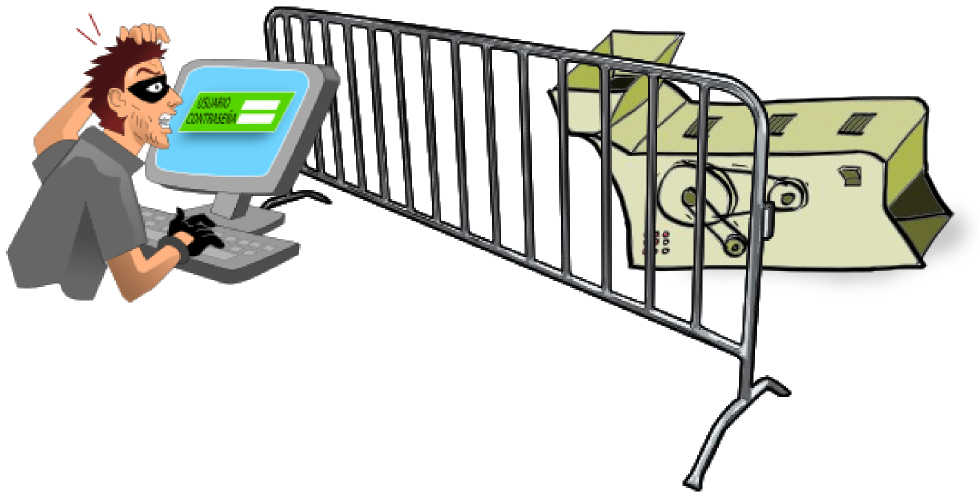

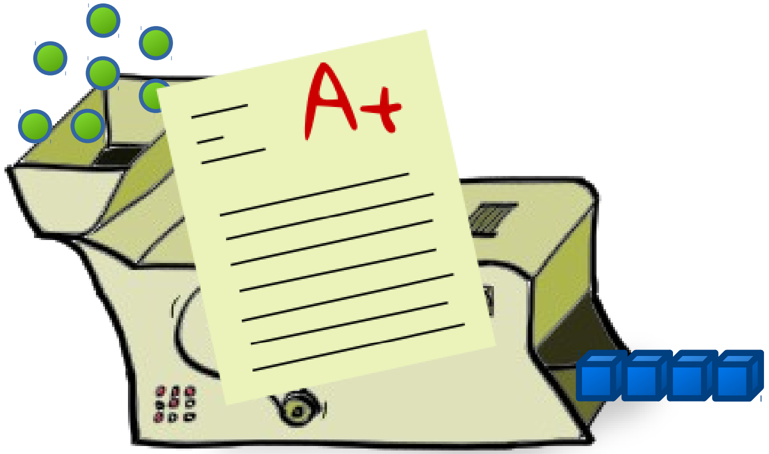

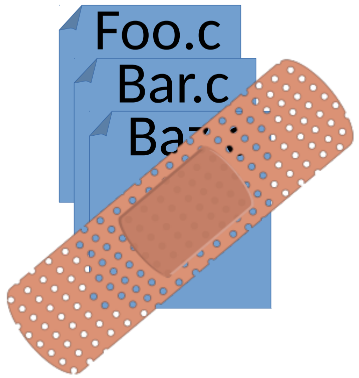

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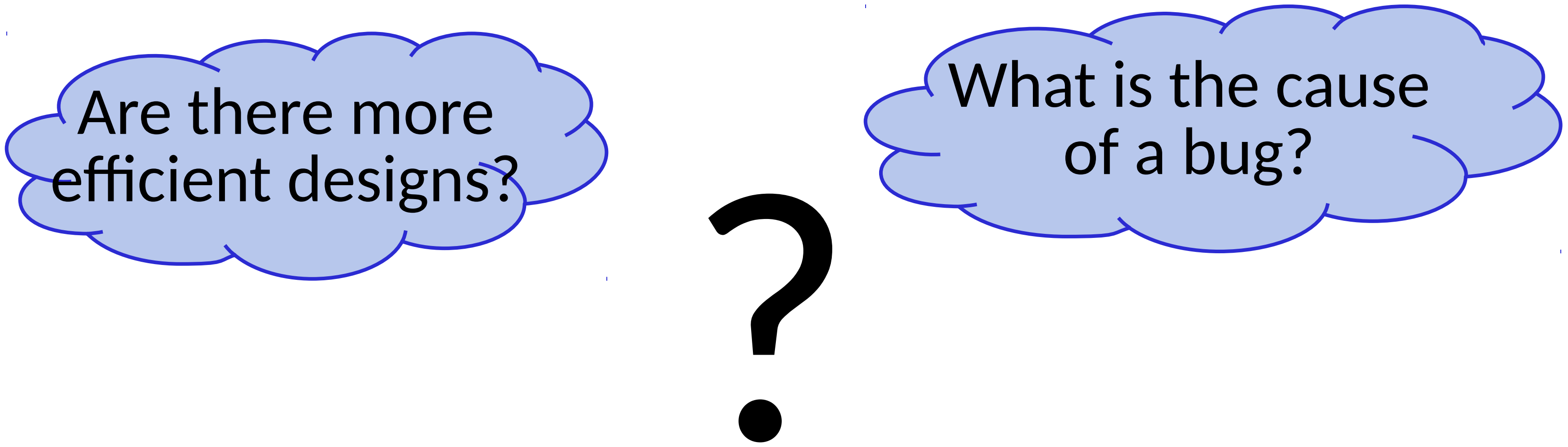
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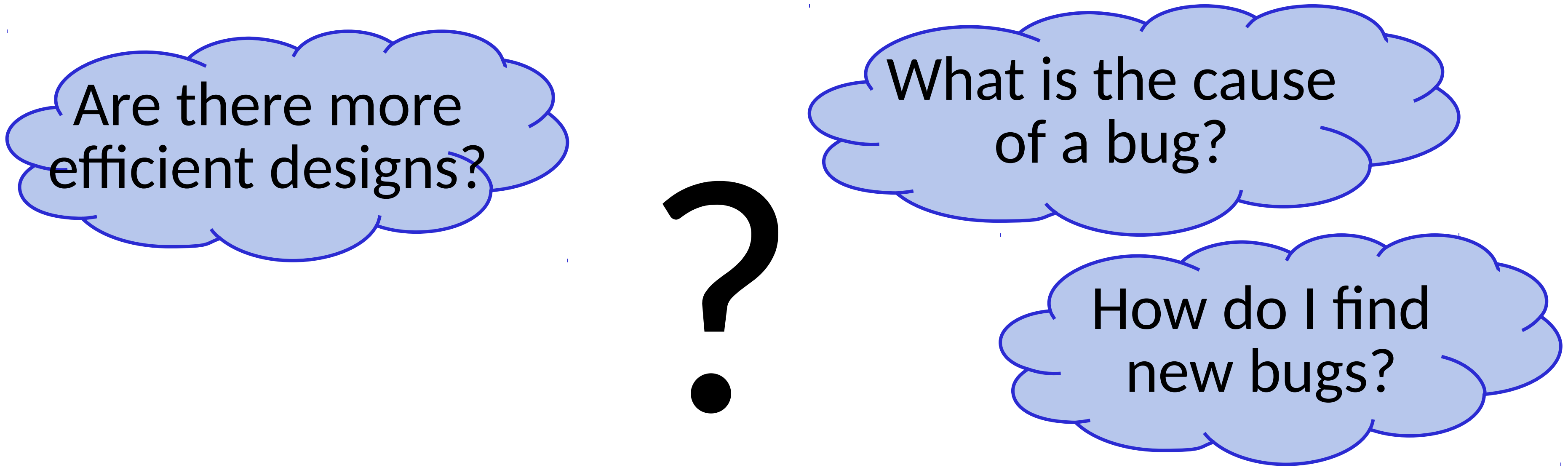
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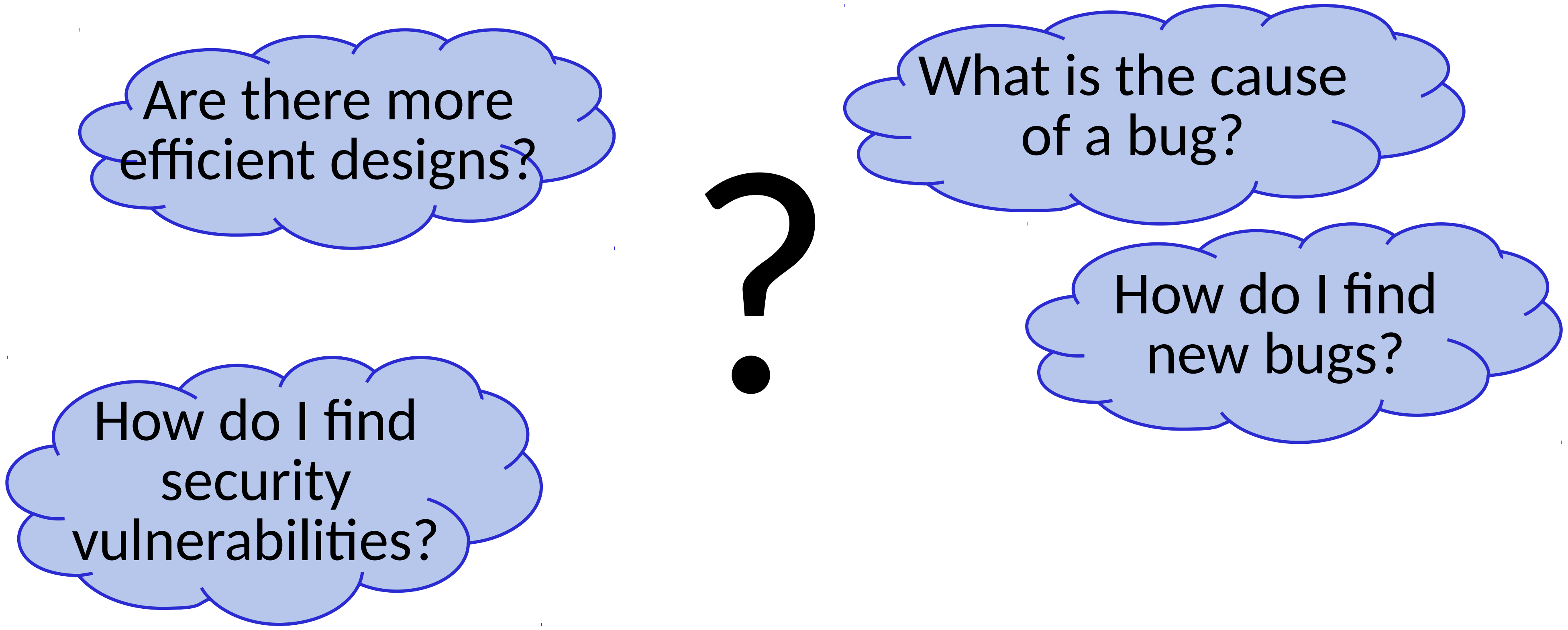
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How do I find security vulnerabilities?

Can I protect against them?

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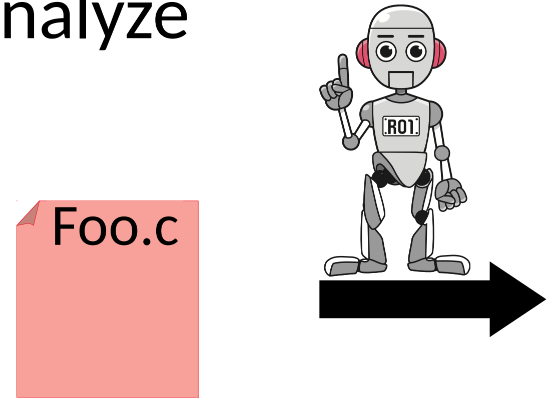

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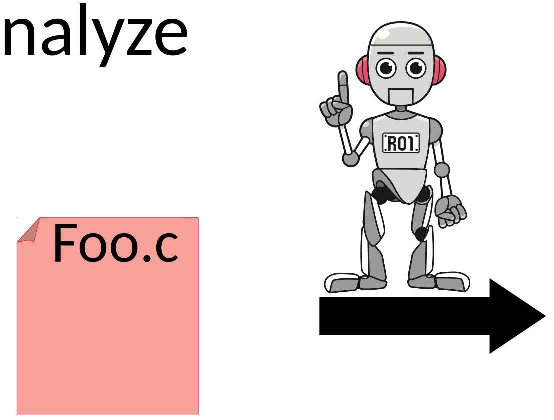

It looks like you have a bug!
A causes B at line 5.
B causes C at line 20.
C causes a crash at line 25!

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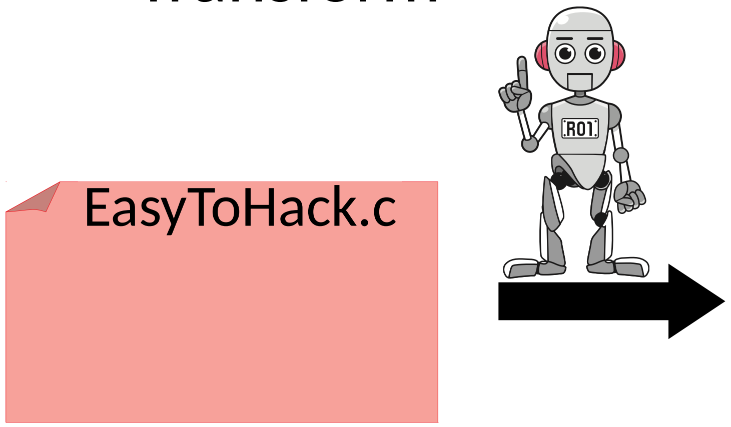

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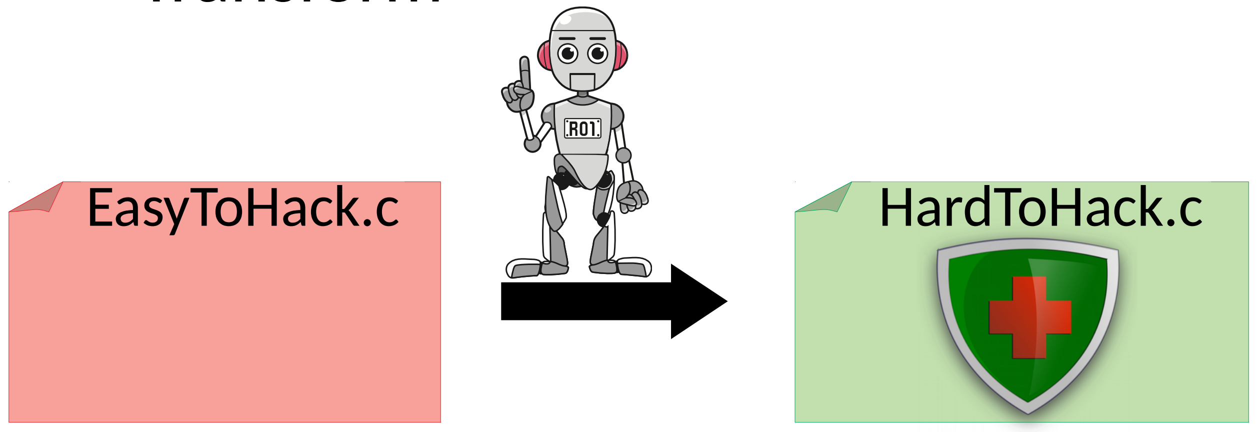

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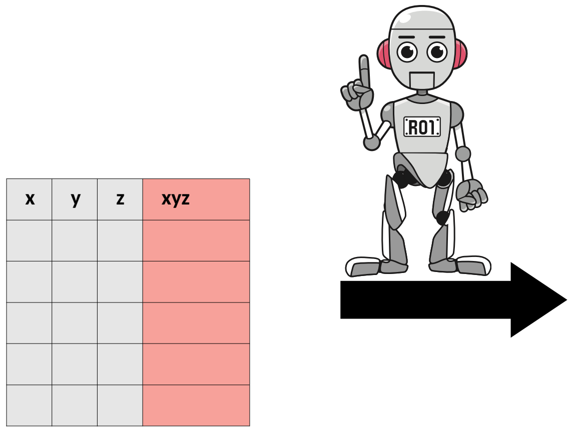

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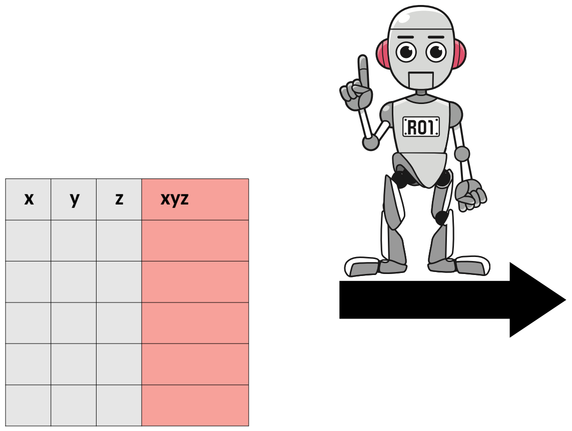

= A1 + if(A1 > B1, A1+B1, A1*C1)

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- The family of techniques, representations, and tasks for analyzing programs comprise *program analysis*.

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    - Profiling

    (Speed, Potential Concurrency, Memory, …)

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  - Survey of *program analysis* techniques & papers
    - Profiling
    - Testing

More effective tests. Bridge testing & verification

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- Learn how the difficult tasks in development can be pushed onto computers.
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    - Testing
    - Debugging

      Explaining or locating the causes of bugs

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    - Debugging
    - Concurrency

How to explain race conditions?

Atomicity violations?

How to find 'Heisenbugs'?

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    - Testing
    - Debugging
    - Concurrency
    - Security

How to find vulnerabilities before attackers.

(...or as attackers)

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    - Testing
    - Debugging
    - Concurrency
    - Security
    - Verification

How to prove the absence of behaviors.

Lens

Guiding questions:

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  - Brief critique (1-2 pages) on weeks you don't present

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- 3 small projects to introduce core skills
- 1 large course project

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- Guidelines on website
- 2 Goals
  - Help reinforce the material for the class
  - Lead an interesting discussion to examine the trade offs of each technique. (I'll be helping.)

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- Groups of TBD (5?) will present each paper.
  - Volunteer or be volunteered

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- 1-2 page response to 1 paper each week that you do not present.
- Primarily meant to prepare you for the discussion on the paper that week.

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  - You can use office hours to help find a direction.

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What you get out of a class like this
is driven by what you are willing to put into it.

Let’s get started…