

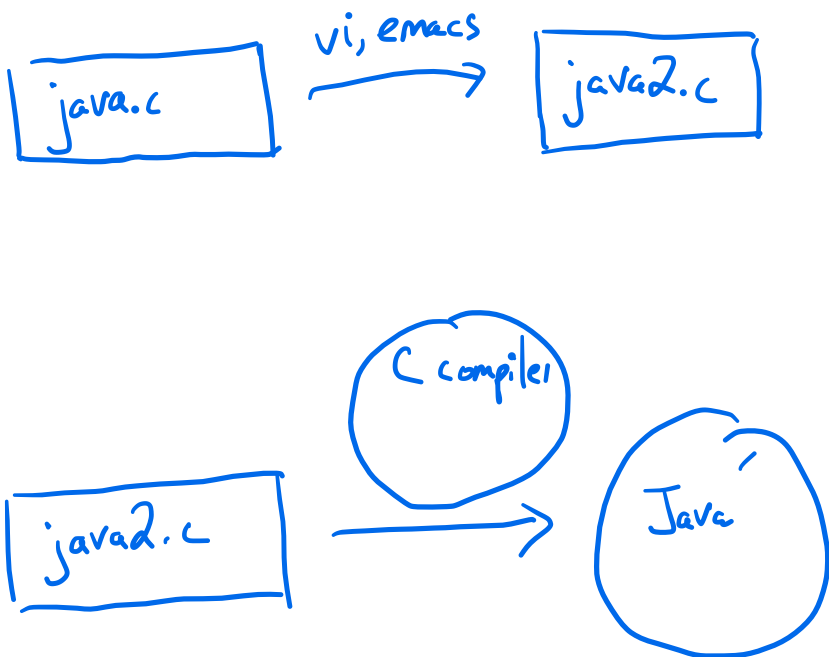
- 1. Last time
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  - Context
  - Goal: bug login [and keep it bugged]
  - Self-reproducing programs
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## 2. Trusting trust

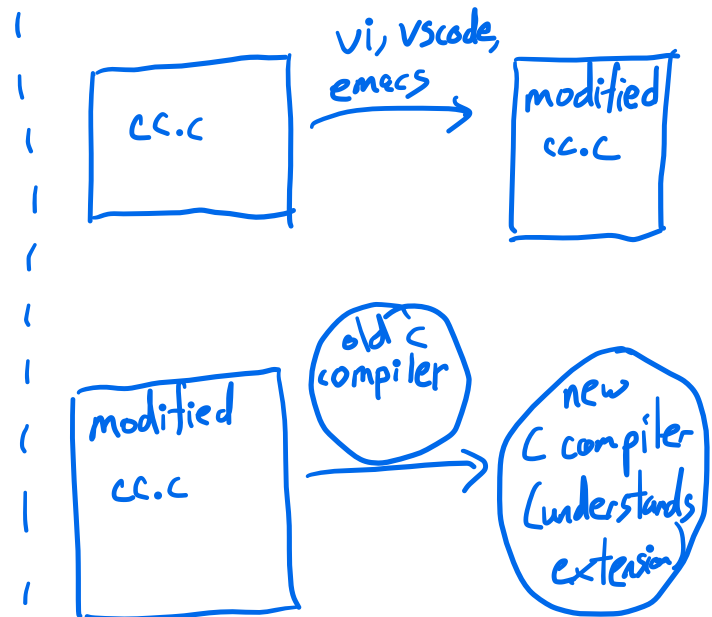
### A. Background

### B.1 Adding a feature to a language

Say we want the token "cs202" in a .java file to produce `System.print("hi")`. We do this:

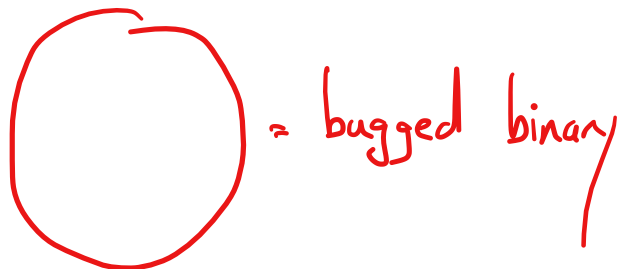
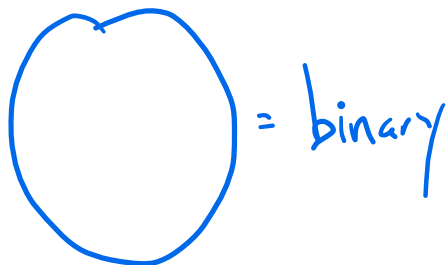
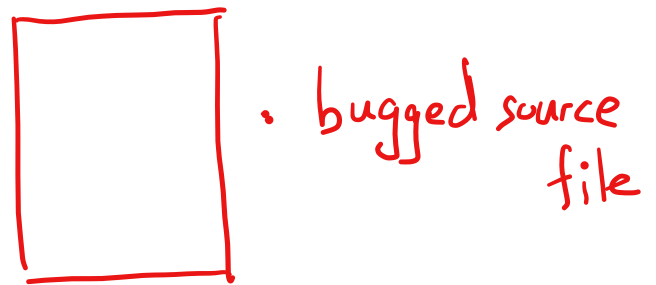
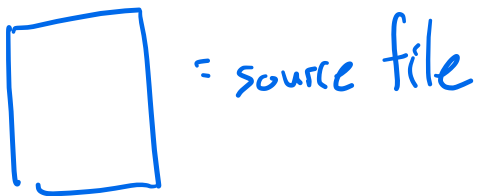
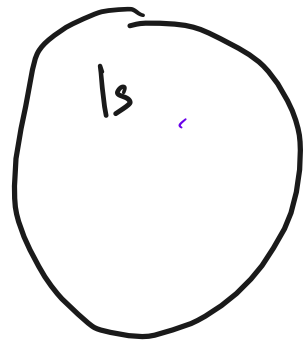
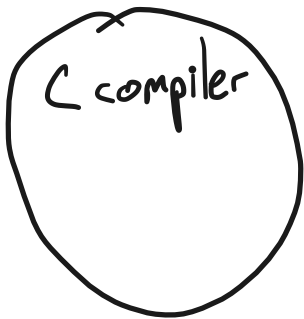
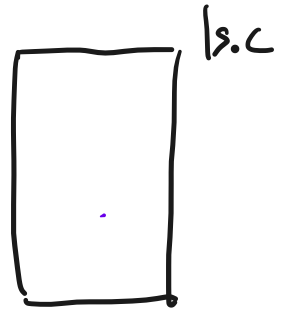
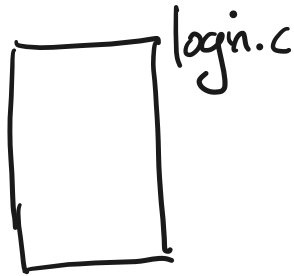
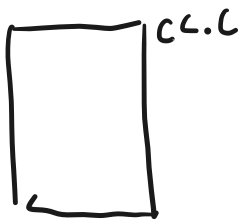


We can do the same thing to extend C:



The compiler for Java now recognizes "cs202" as a token in Java files

## C. Context

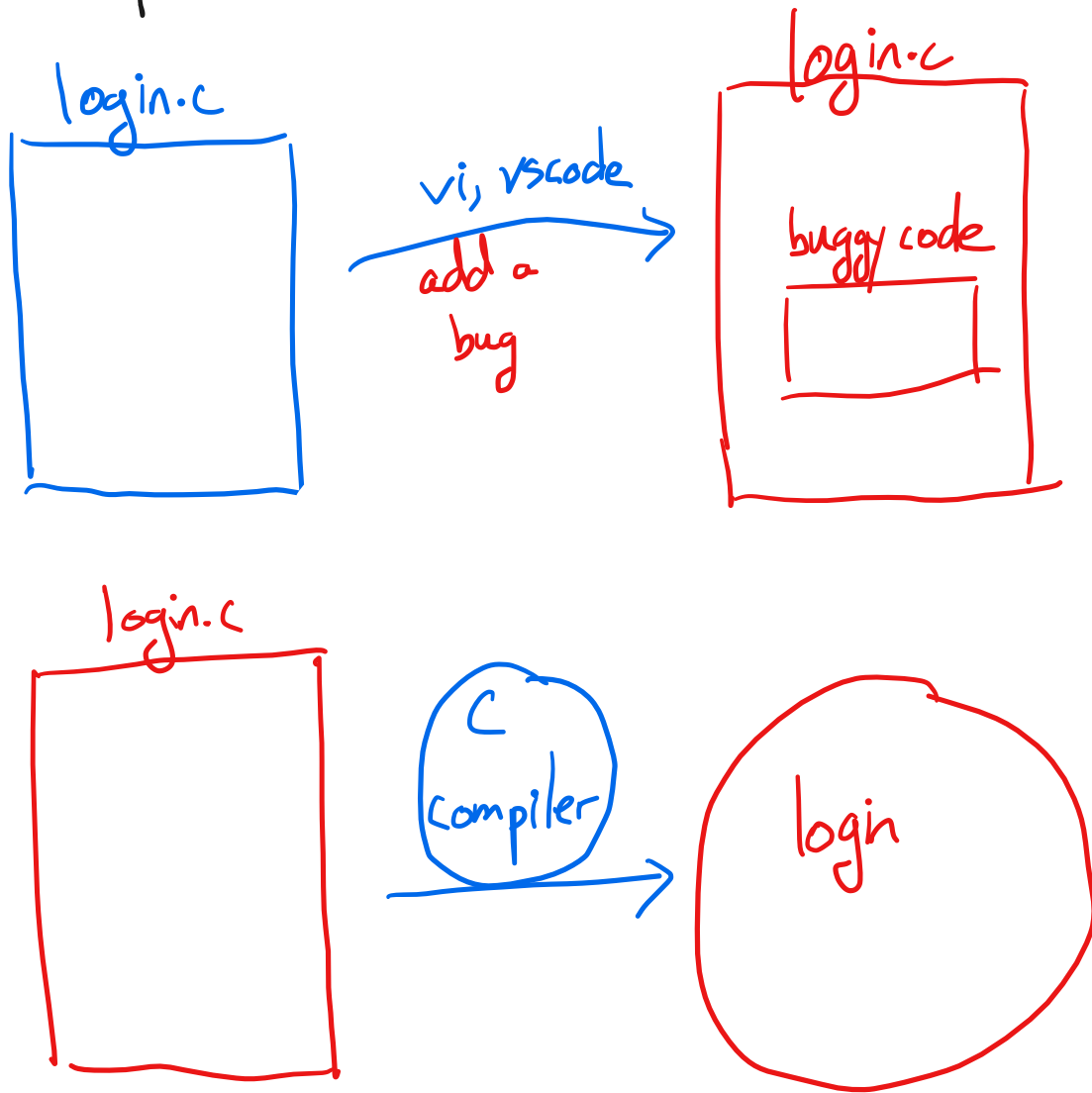


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... trace in any source files keep

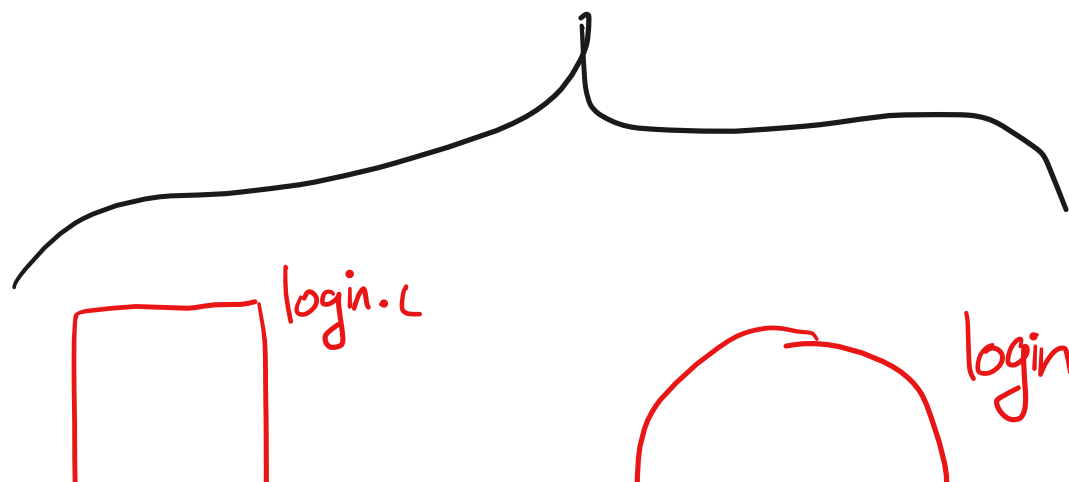
D. Goal: bug login, leave no trace in any source code, so that it bugged across recompilations.

D.1 First attempt:

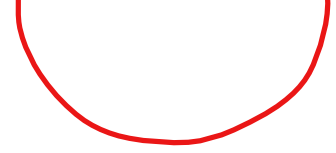
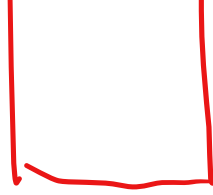


Distribute:

"Problem":  
anyone looking



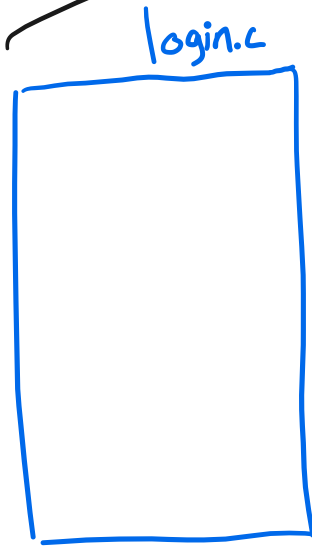
at login.c can see that it is bugged.



D.2 Second attempt:

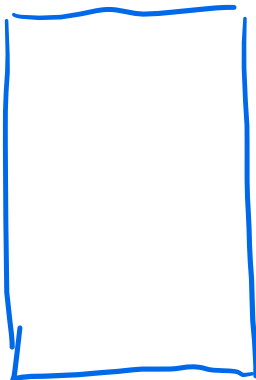
Distribute

"Problem": recompile login.c and login becomes non-bugged again

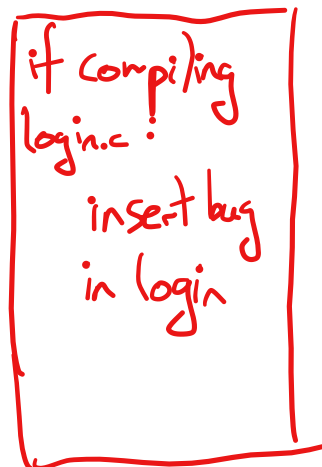


D.3. Third attempt:  
bug the C compiler!

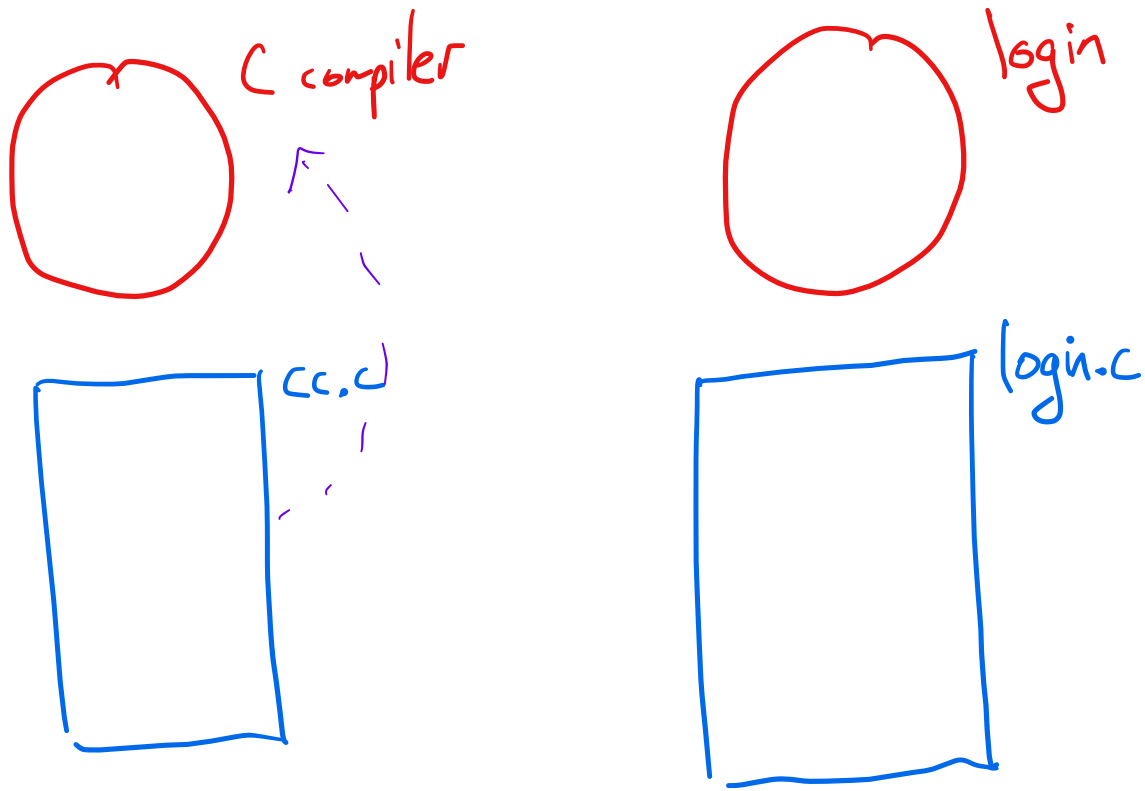
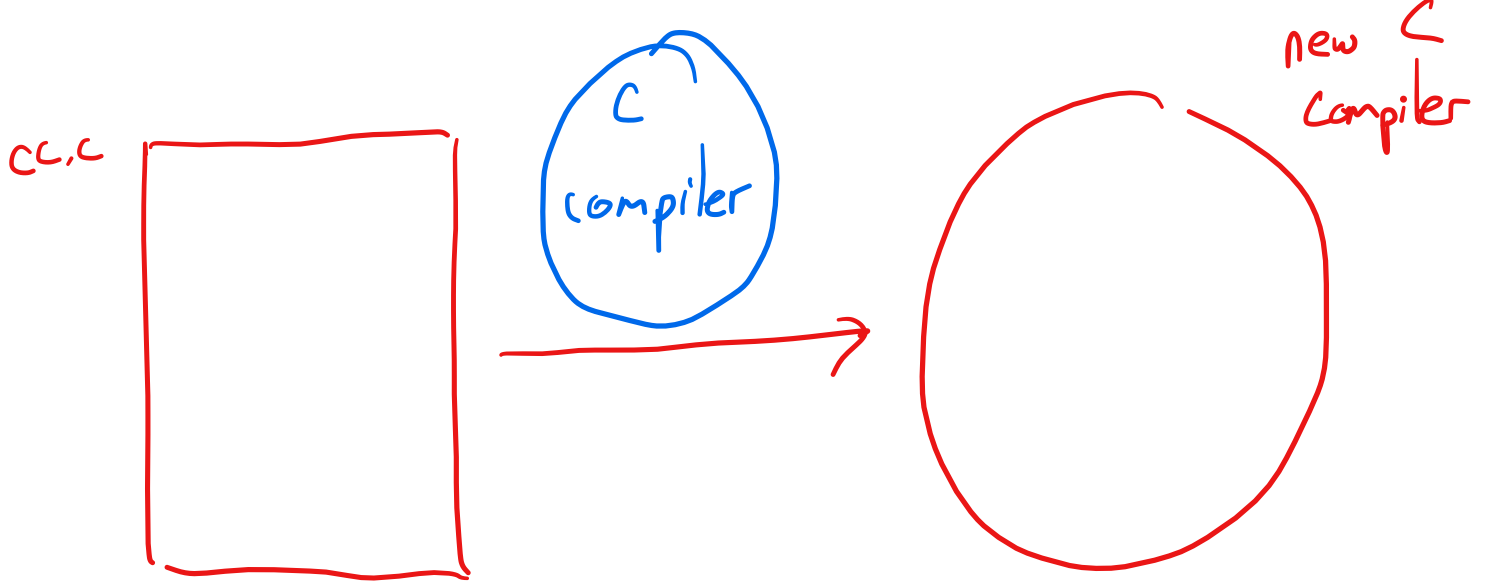
cc.c



vi, emacs, vscode  
add a bug

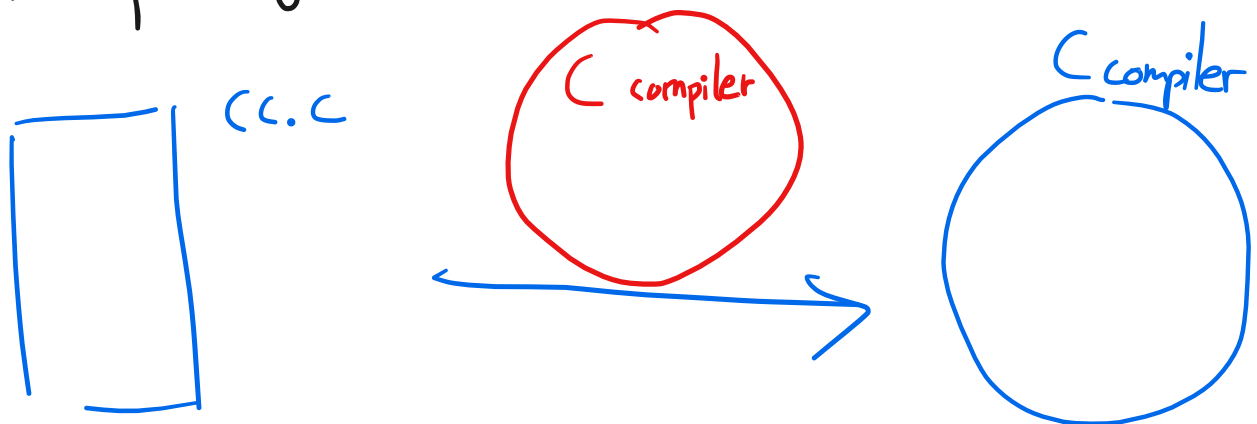


cc.c



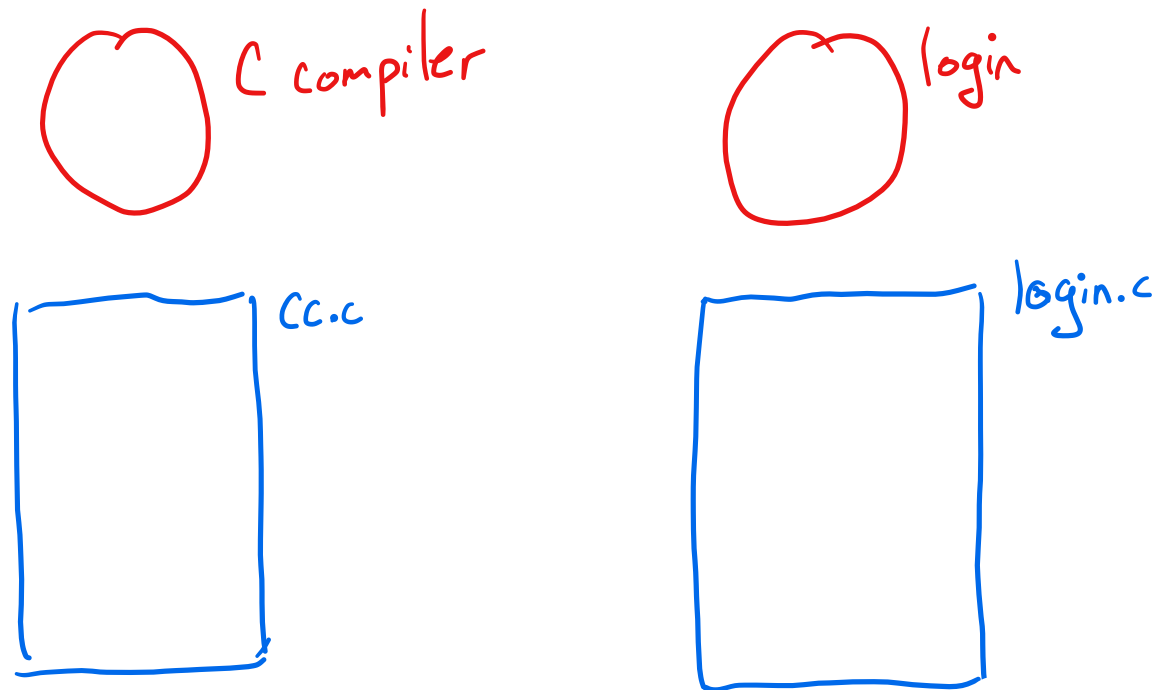
Close!! No trace in source

- Recompile login  $\Rightarrow$  bugged login



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Goal: make this picture stable:



## E. Self-reproducing programs

$X = \text{"Output 'X', Output '='. Output quote mark.}$   
 $\text{Output X. Output quote mark. Output X.}$

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 $\text{Output quote mark. Output X.}$

$X = \text{"Output 'X', Output '='. Output quote mark.}$   
 $\text{Output X. Output quote mark. Output X.}$

$\text{Output 'X', Output '='. Output quote mark.}$   
 $\text{Output X. Output quote mark. Output X.}$

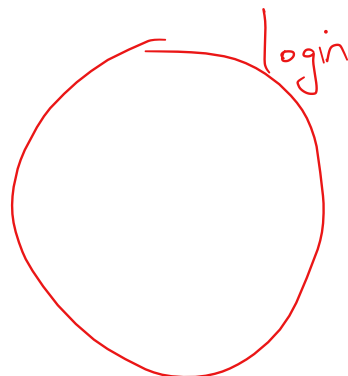
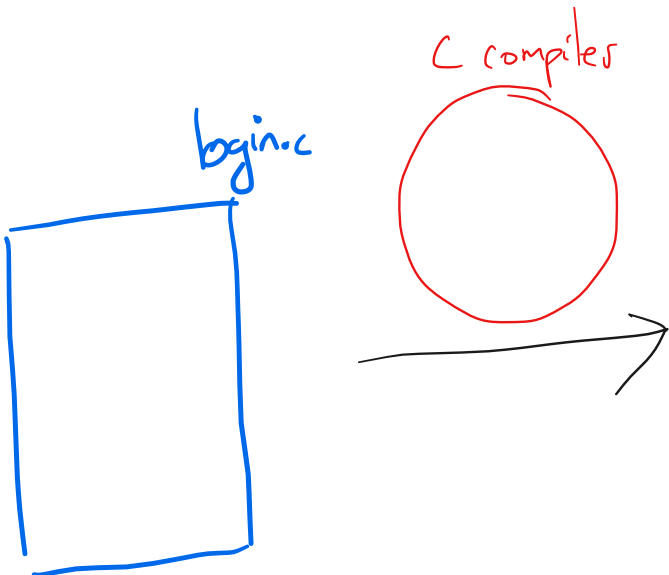
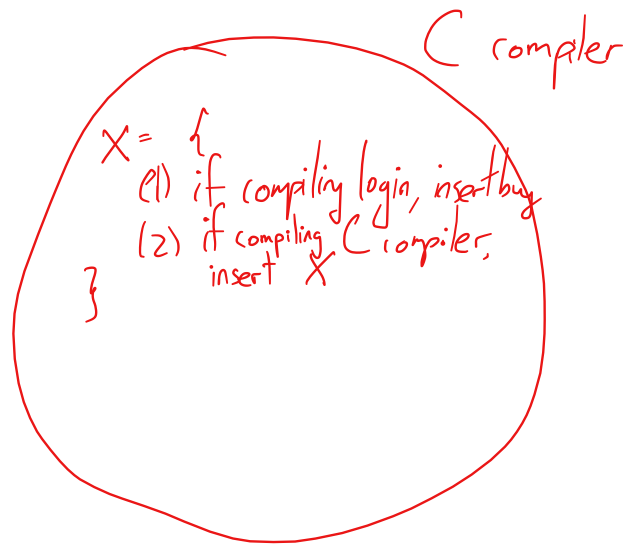
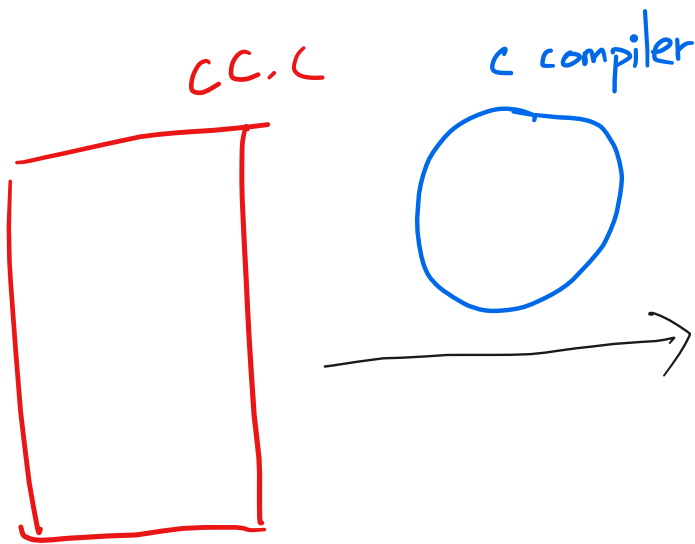
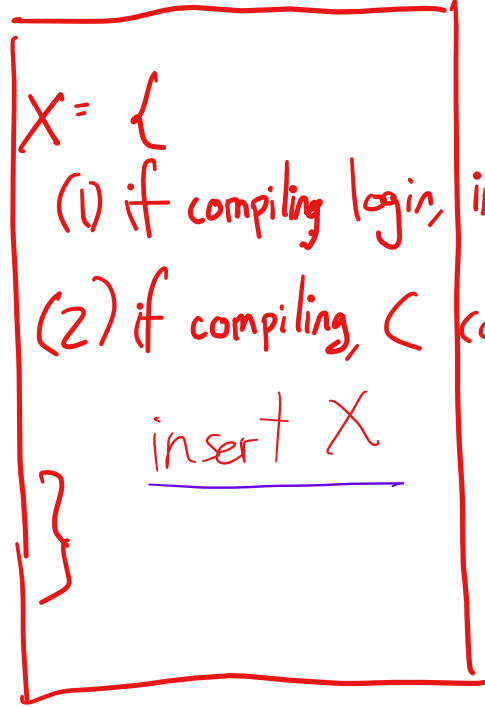
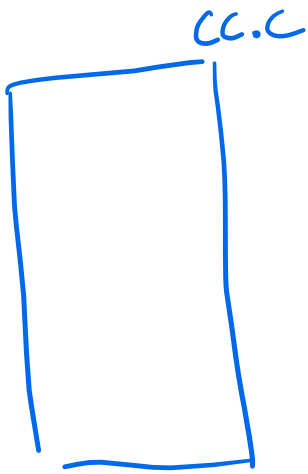
quine

Print this followed by its quotation:  
 $\text{"Print this followed by its quotation."}$

$((\text{lambda } (x) \text{ ` } (, x \text{ ' } x))$

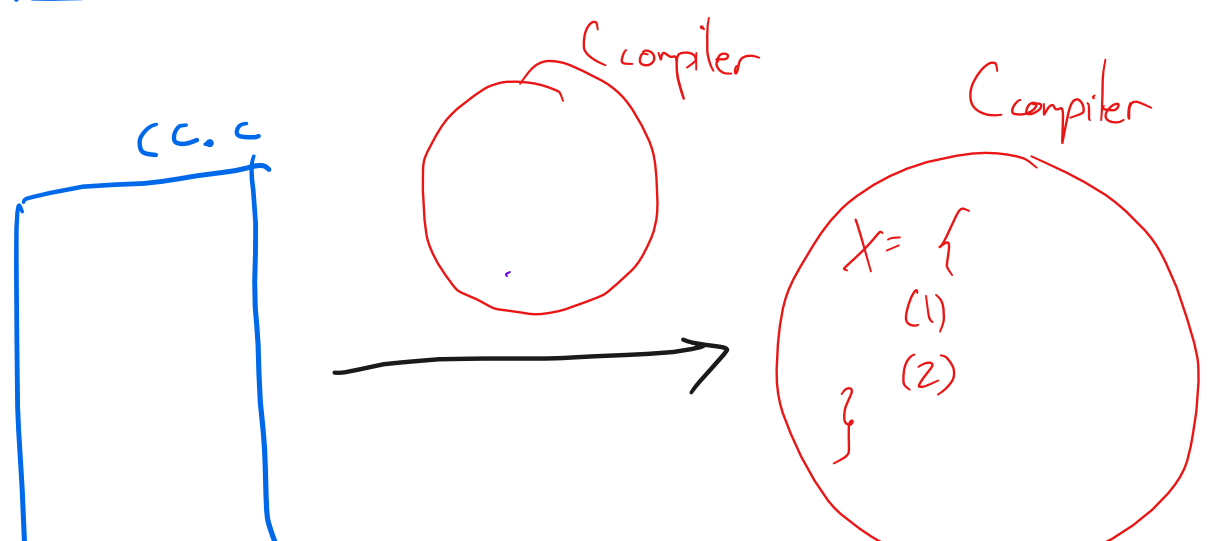
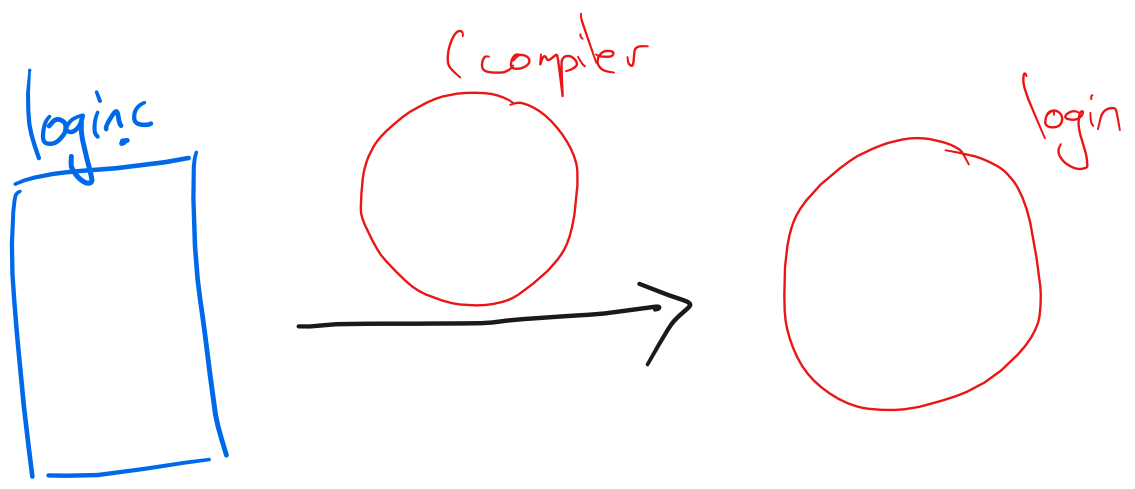
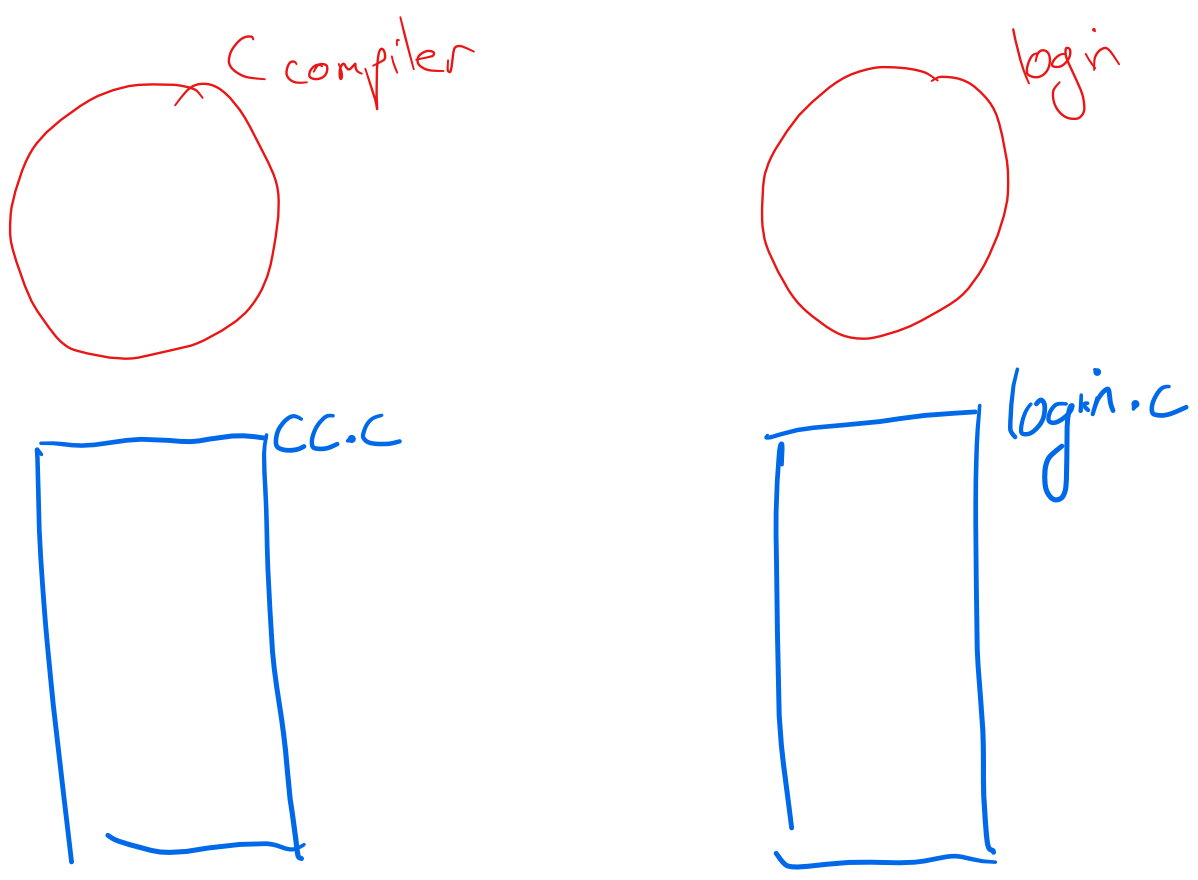
$\text{'(lambda } (x) \text{ ` } (, x \text{ ' } x))$

F.1





F.2



Now it is stable!

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