

Thursday Dec. 6

Exam Review Session I

$$\checkmark \{b > a\} \quad b := b - a \quad \{b = b_0 - a_0\}$$

$$wp(b := b - a, \{b = b_0 - a_0\})$$

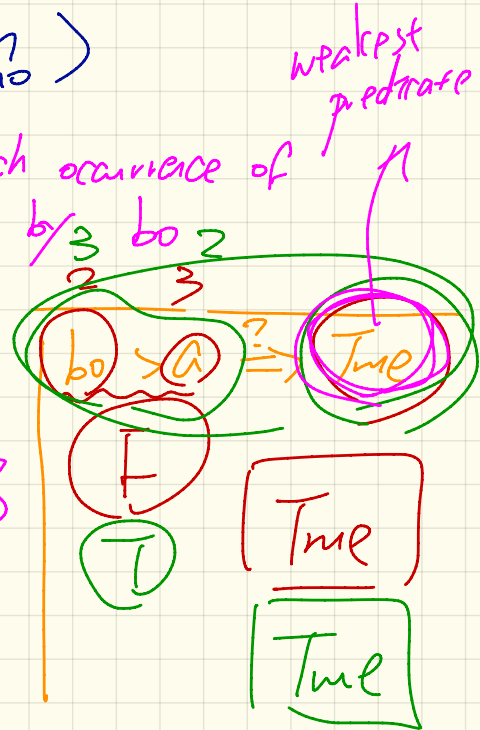
$$= \{ \text{wp rule for } := \}$$

replace each occurrence of b by $b_0 - a_0$

$$b_0 - a_0 = b_0 - a_0$$

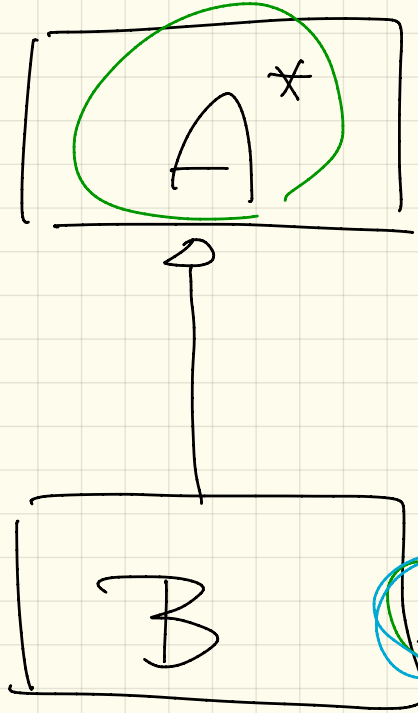
$$= \{ \text{tmp does not modify 'a'} \}$$

~~$$b_0 - a_0$$~~ True



P q | P \Rightarrow q

T	T	T
T	F	F
F	T	T
F	F	T



local

b: B

a A

create {B} b

b. fz ✓

static type B

new

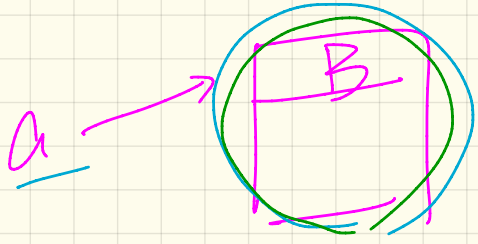
create {B} a ✓

DT

a fz X

static type: A

check attached {B} a bo
then bo. fz end as



Open-Close Principle

~~open~~

closed

~~closed~~

open

expression language

expression operations

EXPRESSION*

accept(v: VISITOR)*

COMPOSITE*

left, right: EXPRESSION

CONSTANT+

accept(v: VISITOR)+

ADDITION+

accept(v: VISITOR)+

Accept(v: V)

EVALUATOR+

visit_constant(c: CONSTANT)+
visit_addition(a: ADDITION)+

PRETTY PRINTER+

visit_constant(c: CONSTANT)+
visit_addition(a: ADDITION)+

TYPE CHECKER+

visit_constant(c: CONSTANT)+
visit_addition(a: ADDITION)+

VISITOR*

visit_constant(c: CONSTANT)*
visit_addition(a: ADDITION)*

visit multiplication(m: M)

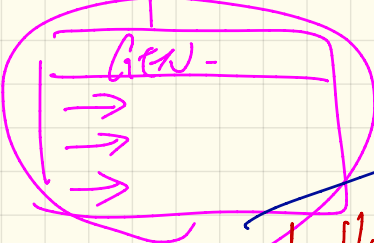
visit_m(...)

visit_m(...)

visit(...)

satisfies OCP

but violates SCP



Runtime: double dispatch

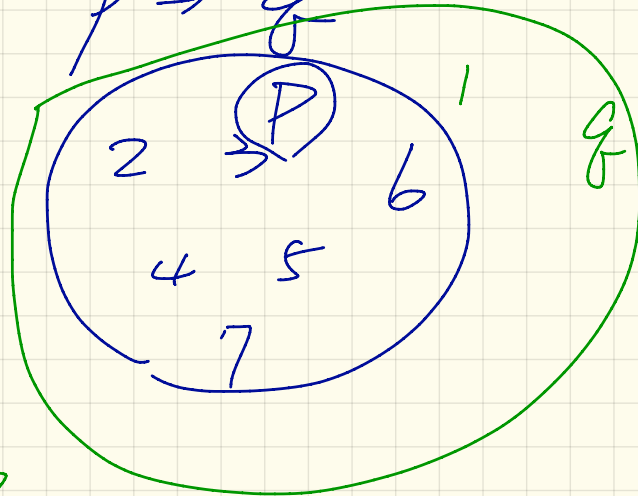
$$\underline{P} \quad \underline{x \geq 2}$$

$$\underline{Q}$$

$$\underline{x \geq 1}$$

P is stronger if $P \Rightarrow Q$

$$\{x \mid p(x)\}$$



$$\{x \mid q(x)\}$$

Subcontracting

Preconditions

P is stronger than Q

require

$P: x \geq 2$

↓
require more
than Q

(by not accepting 1)

require

$Q: x \geq 1$

↓
require less

than Q
(by allowing 1)

Postconditions

ensure

$P: x \geq 2$

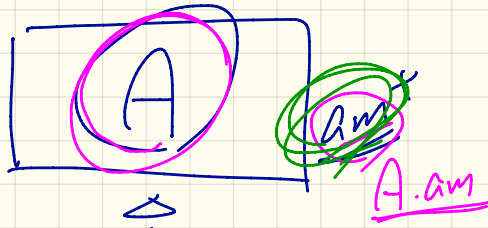
ensure more
than Q

(by denying
accept value 1)

ensure

$Q: x \geq 1$

ensuring
(by accepting 1)



A.am

local

a: A
b: A
c: A

create {A} a

create {B} b

create {C} c

am++

C.am

ST: A

①	A.am	A.am
②	B.am	A.am
③	C.am	C.am