

CAP - Exercise: Op. semantics for procedures (chapter 8)

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Abstract syntax :

$$\begin{aligned} S &\in \mathbf{Stm} \\ S &::= x := a | \mathbf{skip} | S_1; S_2 | \\ &\quad \mathbf{if} \ b \ \mathbf{then} \ S_1 \ \mathbf{else} \ S_2 | \\ &\quad \mathbf{while} \ b \ \mathbf{do} \ S | \\ &\quad \mathbf{begin} \ D_V D_P; S \ \mathbf{end} | \\ &\quad \mathbf{call} \ p \\ D_V &::= \mathbf{var} \ x := a; D_V | \varepsilon \\ D_P &::= \mathbf{proc} \ p \ \mathbf{is} \ S; D_P | \varepsilon \end{aligned}$$

EXERCISE ► **Operational semantics**

For the following miniwhile with procedures program :

```
(0) begin
(1)   var x:=0
(2)   proc p is x:=x*2
(3)   proc q is call p
(4)   begin
(5)     var x:=5
(6)     proc p is x:=x+1
(7)     call q
(8)     y:=x
(9)   end
(10)end
```

Apply the semantic rules of the course with :

- A Dynamic binding for variables and procedures.
- Dynamic binding for variables, and static for procedures.

EXERCISE ► **Procedures with parameters**

Add a new abstract syntax for the mini-while with procedures with two parameters. Give a formal “call by value” semantics (environment, update, call). Give an example.