

# 8~10

## 8:インタプリタ

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CafeOBJ> in subject8/ex1.cafe

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/./subject8/ex1.cafe

-- defining module! BOOL-ERR
-- reading in file : bool

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/bool.cafe

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/base_bool.cafe

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/truth.cafe

-- defining module! TRUTH
-- reading in file : truth

-- done reading in file: truth

-- defining module* BASE-BOOL
-- reading in file : eql

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/eql.cafe

-- defining module! EQL
-- done reading in file: eql

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/sys_bool.cafe

-- defining module! BOOL
-- done reading in file: bool

-- defining module! NAT-ERR
-- reading in file : nat

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/nat.cafe

-- defining module! NAT
-- reading in file : nznat

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/lib/nznat.cafe

-- defining module! NZNAT
-- done reading in file: nznat

-- done reading in file: nat

-- defining module! PAIR
-- defining module* TRIV-ERR
-- defining module! LIST
-- defining module* VAR
-- defining module! ENTRY
-- defining view
-- defining module! EXP
-- defining module! STM
-- defining module! ENV
-- defining module! INTERPRET
-- opening module ENVTRIV-ERR2ENTRY
-- reduce in %ENV : (env):Env
((x , 0) | ((y , 1) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 6 rewrites + 16 matches)
-- reduce in %ENV : (errEnv):ErrEnv
(errEnv):ErrEnv
(0.0000 sec for parse, 0.0000 sec for 0 rewrites + 0 matches)
-- reduce in %ENV : (lookup(env,x)):Nat&Err
(0):Zero
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)
-- reduce in %ENV : (lookup(env,y)):Nat&Err
(1):NzNat
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)
-- reduce in %ENV : (nth(env,1)):Entry&Err
(y , 1):Entry
(0.0000 sec for parse, 0.0000 sec for 9 rewrites + 24 matches)
-- reduce in %ENV : (nth(env,2)):Entry&Err
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-- reduce in %ENV : (nth(env,2)):Entry&Err
(errEntry):ErrEntry
(0.0000 sec for parse, 0.0000 sec for 11 rewrites + 28 matches)
-- opening module INTERPRET
[Warning]: the operator of the same rank has already been declared:
  errNat : -> ErrNat

... ignored.
-- reduce in %INTERPRET : (evalExp((x == y),env)):Nat&Err
(0):Zero
(0.0000 sec for parse, 0.0000 sec for 45 rewrites + 97 matches)
-- reduce in %INTERPRET : (evalExp((x + y),env)):Nat&Err
(24):NzNat
(0.0000 sec for parse, 0.0000 sec for 24 rewrites + 56 matches)
-- reduce in %INTERPRET : (evalExp((x - y),env)):Nat&Err
(16):NzNat
(0.0000 sec for parse, 0.0000 sec for 24 rewrites + 56 matches)
-- reduce in %INTERPRET : (evalExp((x * y),env)):Nat&Err
(80):NzNat
(0.0000 sec for parse, 0.0000 sec for 24 rewrites + 59 matches)
-- reduce in %INTERPRET : (evalExp((x / y),env)):Nat&Err
(5):NzNat
(0.0000 sec for parse, 0.0000 sec for 24 rewrites + 59 matches)
-- reduce in %INTERPRET : (evalExp((x % y),env)):Nat&Err
(0):Zero
(0.0000 sec for parse, 0.0000 sec for 24 rewrites + 60 matches)
-- reduce in %INTERPRET : (evalExp((x < y),env)):Nat&Err
(0):Zero
(0.0000 sec for parse, 0.0000 sec for 45 rewrites + 101 matches)
-- reduce in %INTERPRET : (evalExp((x > y),env)):Nat&Err
(1):NzNat
(0.0000 sec for parse, 0.0000 sec for 45 rewrites + 101 matches)
-- reduce in %INTERPRET : (evalExp((x && y),env)):Nat&Err
(1):NzNat
(0.0000 sec for parse, 0.0000 sec for 51 rewrites + 112 matches)
-- reduce in %INTERPRET : (evalExp((x || y),env)):Nat&Err
(1):NzNat
(0.0000 sec for parse, 0.0000 sec for 51 rewrites + 111 matches)
-- reduce in %INTERPRET : (eval((x := n(10) ;),env)):Env&Err
((x , 10) | ((y , 4) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 12 rewrites + 28 matches)
-- reduce in %INTERPRET : (eval((x := n(10) ;),errEnv)):Env&Err
(errEnv):ErrEnv
(0.0000 sec for parse, 0.0000 sec for 1 rewrites + 2 matches)
-- reduce in %INTERPRET : (eval((x := (y % n(0)) ;),env)):Env&Err
(errEnv):ErrEnv
(0.0000 sec for parse, 0.0000 sec for 20 rewrites + 48 matches)
-- reduce in %INTERPRET : (lookup(env,x)):Nat&Err
(20):NzNat
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)
-- reduce in %INTERPRET : (lookup(env,y)):Nat&Err
(4):NzNat
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)
-- reduce in %INTERPRET : (eval((if (x > y) { (z := x ; ) } else { (z := y ; ) },env)):Env&Err
((x , 20) | ((y , 4) | ((z , 20) | empEnv))):Env
(0.0000 sec for parse, 0.0000 sec for 64 rewrites + 147 matches)
-- reduce in %INTERPRET : (lookup(env,z)):Nat&Err
(errNat):ErrNat
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 30 matches)
-- reduce in %INTERPRET : (eval((while (x > n(5)) { (x := (x - n(10)) ; ) },env)):Env&Err
((x , 0) | ((y , 4) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 206 rewrites + 467 matches)
-- reduce in %INTERPRET : (eval((for x n(0) n(10) { (y := (y + n(1)) ; ) },env)):Env&Err
((x , 11) | ((y , 15) | empEnv)):Env
(0.0000 sec for parse, 0.0156 sec for 3194 rewrites + 7171 matches)
-- reduce in %INTERPRET : (lookup(env,x)):Nat&Err
(20):NzNat
(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)

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CafeOBJ> █

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(0.0000 sec for parse, 0.0000 sec for 13 rewrites + 29 matches)
-- reduce in %INTERPRET : (eval(p1,env)):Env&Err
((x , 3628800) | ((y , 11) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 3006 rewrites + 6759 matches)
-- reduce in %INTERPRET : (eval(p2,env)):Env&Err
((x , 3628800) | ((y , 11) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 3007 rewrites + 6766 matches)
-- reduce in %INTERPRET : (eval(p3,env)):Env&Err
((x , 6) | ((y , 0) | ((z , 0) | empEnv))):Env
(0.0000 sec for parse, 0.0156 sec for 492 rewrites + 1147 matches)
-- reduce in %INTERPRET : (eval(p4,env)):Env&Err
((x , 2000000000000000) | ((y , 141421356) | ((z , 141421356) | ((tmp , 141421356) | empEnv)))):Env
(0.0000 sec for parse, 0.0625 sec for 21625 rewrites + 48774 matches)

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CafeOBJ> █

## 9：仮想マシン

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CafeOBJ> in subject9/ex1.cafe

processing input : C:/Users/rmjap/Downloads/cafeobj-1.6.2-sbcl-win64/dist/cafeobj-1.6-sbcl/./subject9/ex1.cafe

-- defining module! BOOL-ERR
[Warning]: Redefining module BOOL-ERR
-- defining module! NAT-ERR
[Warning]: Redefining module NAT-ERR
-- defining module! PAIR
[Warning]: Redefining module PAIR
-- defining module* TRIV-ERR
[Warning]: Redefining module TRIV-ERR
-- defining module! LIST
[Warning]: Redefining module LIST
-- defining module* VAR
[Warning]: Redefining module VAR
-- defining module! ENTRY
[Warning]: Redefining module ENTRY
-- defining view TRIV-ERR2ENTRY
[Warning]: redefining view TRIV-ERR2ENTRY
-- defining module! EXP
[Warning]: Redefining module EXP
-- defining module! STM
[Warning]: Redefining module STM
-- defining module! ENV
[Warning]: Redefining module ENV
-- defining module! INTERPRET
[Warning]: Redefining module INTERPRET
-- defining module! INSTRUCT
-- defining view
-- defining module! ILISTTRIV-ERR2INSTRUCT
-- defining view
-- defining module! STACK
-- defining module! VM
-- opening module VMTRIV-ERR2NAT-ERR
-- reduce in %VM : (run(il1)):Env&Err
((x , 1) | ((y , 8) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 45 rewrites + 149 matches)
-- reduce in %VM : (run(il2)):Env&Err
((x , 3) | ((y , 9) | empEnv)):Env
(0.0000 sec for parse, 0.0000 sec for 121 rewrites + 345 matches)
-- reduce in %VM : (run(il3)):Env&Err
((x , 2) | empEnv):Env
(0.0000 sec for parse, 0.0000 sec for 99 rewrites + 368 matches)
-- reduce in %VM : (run(il4)):Env&Err
((x , 16) | ((y , 65536) | empEnv)):Env
(0.0000 sec for parse, 0.0156 sec for 1422 rewrites + 3916 matches)
-- reduce in %VM : (run(il5)):Env&Err
((x , 64) | ((y , 18446744073709551616) | empEnv)):Env
(0.0000 sec for parse, 0.0156 sec for 2116 rewrites + 5830 matches)
```

## 10：コンパイラ

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CafeOBJ> in subject10/ex1.cafe

processing input : C:/Users/rmjap/Downloads/cafesobj-1.6.2-sbcl-win64/dist/cafesobj-1.6-sbcl/./subject10/ex1.cafe

-- defining module! BOOL-ERR
[Warning]: Redefining module BOOL-ERR
-- defining module! NAT-ERR
[Warning]: Redefining module NAT-ERR
-- defining module! PAIR
[Warning]: Redefining module PAIR
-- defining module* TRIV-ERR
[Warning]: Redefining module TRIV-ERR
-- defining module! LIST
[Warning]: Redefining module LIST
-- defining module* VAR
[Warning]: Redefining module VAR
-- defining module! ENTRY
[Warning]: Redefining module ENTRY
-- defining view TRIV-ERR2ENTRY
[Warning]: redefining view TRIV-ERR2ENTRY
-- defining module! EXP
[Warning]: Redefining module EXP
-- defining module! STM
[Warning]: Redefining module STM
-- defining module! ENV
[Warning]: Redefining module ENV
-- defining module! INSTRUCT
[Warning]: Redefining module INSTRUCT
-- defining view TRIV-ERR2INSTRUCT
[Warning]: redefining view TRIV-ERR2INSTRUCT
-- defining module! ILIST
[Warning]: Redefining module ILIST
-- defining view TRIV-ERR2NAT-ERR
[Warning]: redefining view TRIV-ERR2NAT-ERR
-- defining module! STACK
[Warning]: Redefining module STACK
-- defining module! VM
[Warning]: Redefining module VM
-- defining module! COMPILE
-- opening module VM + COMPILE
-- reduce in %VM + COMPILE : (run(compile(p1))):Env&Err
((x , 3628800) | ((y , 11) | empEnv)):Env
(0.0000 sec for parse, 0.0625 sec for 6100 rewrites + 16439 matches)
-- reduce in %VM + COMPILE : (run(compile(p2))):Env&Err
((x , 3628800) | ((y , 11) | empEnv)):Env
(0.0000 sec for parse, 0.0469 sec for 6099 rewrites + 16438 matches)
-- reduce in %VM + COMPILE : (run(compile(p3))):Env&Err
((x , 6) | ((y , 0) | ((z , 0) | empEnv))):Env
(0.0000 sec for parse, 0.0000 sec for 1596 rewrites + 4275 matches)
-- reduce in %VM + COMPILE : (run(compile(p4))):Env&Err
((x , 2000000000000000) | ((y , 141421356) | ((z , 141421356) | ((tmp , 141421356) | empEnv)))):Env
(0.0000 sec for parse, 1.6406 sec for 123686 rewrites + 321141 matches)

CafeOBJ>

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