Declarative Specification of Indentation Rules

A Tooling Perspective on Parsing and Pretty-Printing Layout-Sensitive Languages

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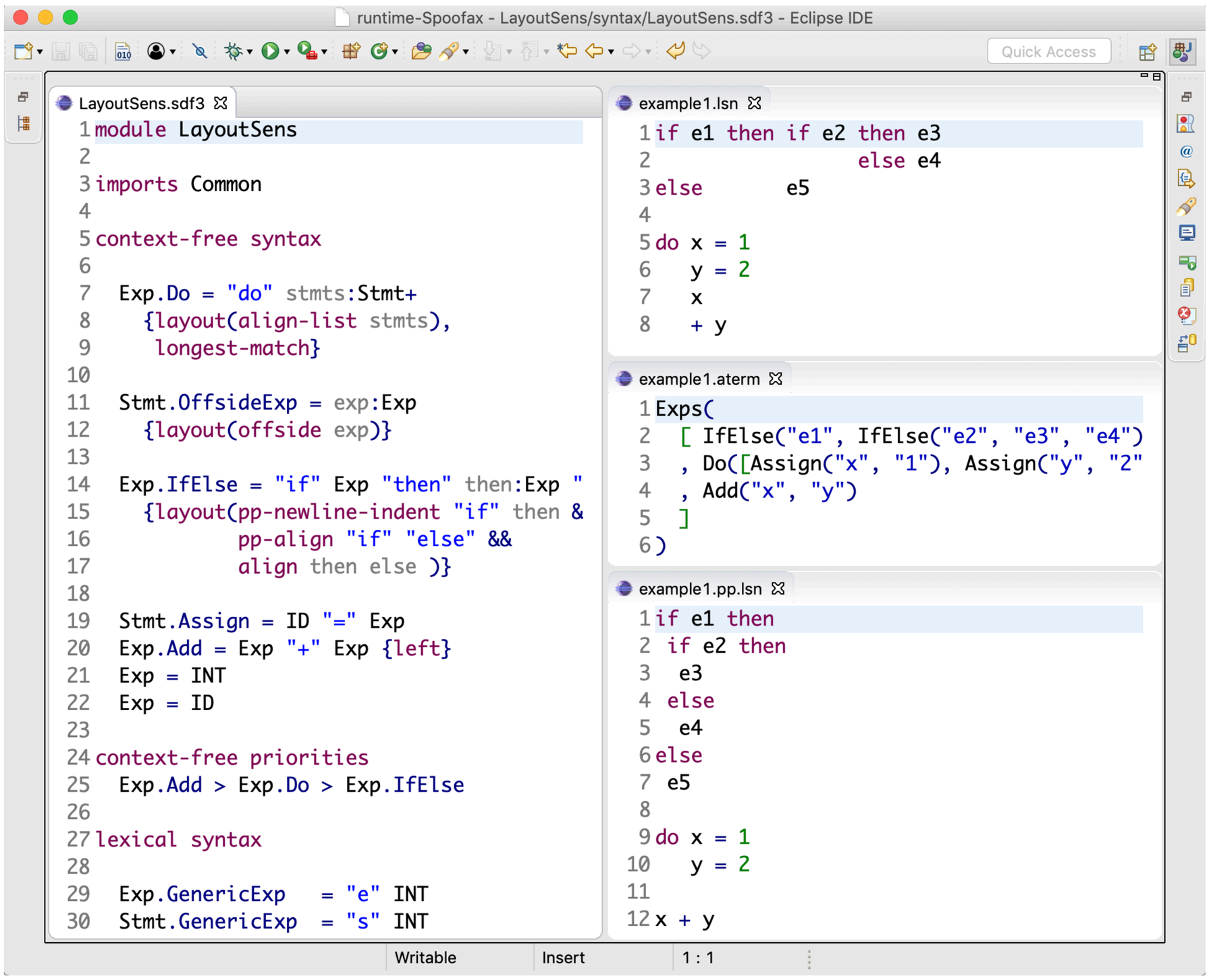
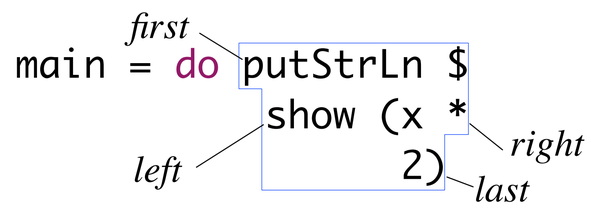


Layout Constraint

```
Stmt.OffsideExp = Exp
  {layout(1.left.col >
          1.first.col)}
```

Program



Layout Declaration

```
Stmt.OffsideExp = exp:Exp
  {layout(offside exp)}
```

Alignment

```
ExpList.Seq = head:Exp tail:Exp+
  {layout(align head tail)}
```

```
x.first.col == y.first.col
```

Invalid Programs	
e1 e2	e1 e2
do s1 s2	do s1 s2

Valid Programs	
e1 e2	e1 + e2 e3 + e4
do s1 s2	do s1 s2

```
Exp.Do = "do" stmts:Stmt+
  {layout(align-list stmts)}
```

```
all(x, 1, 1.first.col == x.first.col)
```

Declaration | Constraint | Invalid Programs | Valid Programs

Offside Rule

```
Stmt.OffsideExp = exp:Exp
  {layout(offside exp)}
```

```
x.left.col > x.first.col
```

Invalid Programs	
e1 + e2	e1 + e2
x = e1 + e2	x = e1 + e2

Valid Programs	
exp1 + exp2	exp1 + exp2
x = e1 + e2	x = e1 + e2

```
Stmt.Assign = ID "=" exp:Exp
  {layout(offside "=" exp)}
```

```
x.left.col > y.first.col
```

Declaration | Constraint | Invalid Programs | Valid Programs

Indentation

```
Exp.Do = "do" stmt:Stmt
  {layout(indent "do" stmt)}
```

```
x.first.col > y.first.col
```

Invalid Programs	
do s1	do s1
do s1	do s1

Valid Programs	
do s1	do s1
do s1	do s1

```
Exp.Do = "do" stmt:Stmt
  {layout(newline-indent "do" stmt)}
```

```
x.first.col > y.first.col &&
x.first.line > y.last.line
```

Declaration | Constraint | Invalid Programs | Valid Programs

Pretty-print

```
Exp.IfElse = "if" Exp "then" then:Exp "else" else:Exp
    {layout(pp-newline-indent "if" then &&
            pp-align "if" "else" &&
            pp-align then else )}
```

Pretty-print Declaration

Valid Program
if e1 then if e2 then e3 else e4 else e5

Pretty-printed Program

if e1 then
if e2 then
e3
else
e4
else
e5