

BU CAS CS 525 (SPRING SEMESTER, 2009)
COMPILER DESIGN

Assignment 5

Out: Thursday, 05 March 2009
Due: Thursday, 19, March 2009

Total: 150 pts

Exercise 1 (individual assignment) (50 pts) *Please do Exercise 5.1 on page 122 in the textbook.*

Exercise 2 (group assignment) (100 points) *Please implement a type-checker for Tiger by following the description on page 121 and page 122 in the textbook. The function `texttttransProg` should be given the following type:*

```
transProg : Absyn.exp -> Expressions.exp * Types.ty
```

where the structure Expressions is given in Figure 1.

```

structure Expressions = struct
  datatype oper =
    PlusOp | MinusOp | TimesOp | DivideOp
  | GtOp | GeOp | LtOp | LeOp
  | AndOp | OrOp
  | IntEq | IntNeq | StrEq | StrNeq | TupEq | TupNeq

  datatype var =
    SimpleVar of Symbol.symbol
  | SelectVar of var * int
  | SubscriptVar of var * exp

  and exp =
    VarExp of var
  | NilExp
  | IntExp of int
  | StringExp of string
  | CallExp of Symbol.symbol * exp list
  | OpExp of exp * oper * exp
  | ArrayExp of exp * exp (* size and init *)
  | TupleExp of exp list
  | SeqExp of exp list
  | AssignExp of var * exp
  | IfThen of exp * exp
  | IfThenElse of exp * exp * exp
  | WhileExp of exp * exp
  | BreakExp
  | LetExp of dec list * exp

  and dec =
    FunDec of fundec list
  | VarDec of Symbol.symbol * exp * bool ref
    (* var, init, escape *)

  withtype param = Symbol.symbol * bool ref

  and fundec = Symbol.symbol * param list * exp

  fun for2while (e: exp): exp = (* turn a for loop into a while loop *)
end

```

Figure 1: The structure *Expressions*