

## Regole di inferenza

### Identificativi

$$\frac{\Gamma(id) = \tau}{\Gamma \vdash id : \tau}$$

### Costanti intere

$$\overline{\Gamma \vdash intconst : integer}$$

### Costanti reali

$$\overline{\Gamma \vdash realconst : real}$$

### Costanti stringhe

$$\overline{\Gamma \vdash stringconst : string}$$

### Costanti booleane

$$\overline{\Gamma \vdash true : bool}$$

$$\overline{\Gamma \vdash false : bool}$$

### Lista di statement

$$\frac{\Gamma \vdash stmt_1 : notype \quad \Gamma \vdash stmt_2 : notype}{\Gamma \vdash stmt_1; stmt_2 : notype}$$

### Lista di dichiarazioni di variabili

$$\frac{\Gamma \vdash vardecl_1 : notype \quad \Gamma \vdash vardecl_2 : notype}{\Gamma \vdash vardecl_1; vardecl_2 : notype}$$

### Lista di funzioni

$$\frac{\Gamma \vdash fun_1 : notype \quad \Gamma \vdash fun_2 : notype}{\Gamma \vdash fun_1; fun_2 : notype}$$

### Chiamata a funzione con o senza tipo di ritorno

$$\frac{\Gamma \vdash f : \tau_1 * \dots * \tau_n \rightarrow \tau \quad \Gamma \vdash e_i : \tau_i^{i \in 1 \dots n}}{\Gamma \vdash f(e_1, \dots, e_n) : \tau}$$

$$\frac{\Gamma \vdash f : \tau_1 * \dots * \tau_n \rightarrow notype \quad \Gamma \vdash e_i : \tau_i^{i \in 1 \dots n}}{\Gamma \vdash f(e_1, \dots, e_n) : notype}$$

#### Dichiarazione di funzione

$$\frac{\Gamma \vdash \text{body} : \text{notype}}{\Gamma \vdash \mathbf{fun} f(e_1, \dots, e_n) : \tau \text{ body } \mathbf{end fun} : \text{notype}}$$

#### Assegnazione

$$\frac{\Gamma(id) = \tau \quad \Gamma \vdash e : \tau}{\Gamma \vdash \text{id} := e : \tau}$$

#### Blocco dichiarazione – istruzione

$$\frac{\Gamma[id \rightarrow \tau] \vdash \text{stmt} : \text{notype}}{\Gamma \vdash \text{id} : \tau}$$

#### Istruzione while

$$\frac{\Gamma \vdash e : \text{bool} \quad \Gamma \vdash \text{body} : \text{notype}}{\Gamma \vdash \mathbf{while} e \mathbf{loop} \text{ body } \mathbf{end loop} : \text{notype}}$$

#### Istruzione if – then

$$\frac{\Gamma \vdash e : \text{bool} \quad \Gamma \vdash \text{body} : \text{notype}}{\Gamma \vdash \mathbf{if} e \mathbf{then} \text{ body } \mathbf{end if} : \text{notype}}$$

#### Istruzione else

$$\frac{\Gamma \vdash \text{body} : \text{notype}}{\Gamma \vdash \mathbf{else} \text{ body} : \text{notype}}$$

#### Operatori unari

$$\frac{\Gamma \vdash e : \tau_1 \quad \text{optype}_1(\text{op}_1, \tau_1) = \tau}{\Gamma \vdash \text{op}_1 e : \tau}$$

#### Operatori binari

$$\frac{\Gamma \vdash e_1 : \tau_1 \quad \Gamma \vdash e_2 : \tau_2 \quad \text{optype}_2(\text{op}_2, \tau_1, \tau_2) = \tau}{\Gamma \vdash e_1 \text{ op}_2 e_2 : \tau}$$

#### Operatori relazionali

$$\frac{\Gamma \vdash e_1 : \tau \quad \Gamma \vdash e_2 : \tau \quad \text{reloptype}(\text{relop}, \tau, \tau) = \text{bool}}{\Gamma \vdash e_1 \text{ relop } e_2 : \text{bool}}$$

#### Operazione write

$$\frac{}{\Gamma \vdash ?e : \text{notype}}$$

#### Operazione read

$$\frac{}{\Gamma \vdash \%e : \text{notype}}$$

#### Operazione return

$$\frac{\Gamma \vdash e : \tau}{\Gamma \vdash \mathbf{return} e : \tau}$$

### Dichiarazione di parametri

$$\frac{\Gamma(id) = \tau}{\Gamma \vdash \text{type id} : \tau}$$

$$\frac{\Gamma(id) = \tau}{\Gamma \vdash \text{out type id} : \tau}$$

### Program

$$\frac{\Gamma \vdash \text{vardecllist} : \text{notype} \quad \Gamma \vdash \text{funlist} : \text{notype} \quad \Gamma \vdash \text{body} : \text{notype}}{\Gamma \vdash \text{vardecllist funlist body} : \text{notype}}$$

## Tabella dei tipi per le operazioni

### Operazioni binarie

ARITH: add, diff, div, mul, pow

REL: equals, less then, less then equals, greater then, greater then equals

Operazione	Primo operando	Secondo operando	Risultato
ARITH	integer	integer	Integer
ARITH	integer	integer	Real
ARITH	real	integer	Real
ARITH	real	real	Real
DIVINT	integer	integer	integer
DIVINT	integer	real	Integer
DIVINT	real	integer	Integer
DIVINT	real	real	Integer
STRCAT	string	string	String
STRCAT	string	integer	String
STRCAT	integer	string	String
STRCAT	String	real	String
STRCAT	Real	String	String
REL	Integer	integer	Bool
REL	integer	Real	Bool
REL	real	Integer	Bool
REL	real	Real	Bool
REL	string	String	Bool
AND	Bool	Bool	Bool
OR	Bool	Bool	bool

### Operazioni unarie

Operazione	Operando	Risultato
NOT	Bool	Bool
MINUS	Integer	Integer
MINUS	Real	Real

