

# CS6124D: Topics in Programming Languages

## Records 19.03.2020

- generalization from  $n$ -ary tuples to labelled records
- each field  $t_i$  annotated with a label  $l_i$ , distinct labels drawn from a predetermined set  $\mathcal{L}$
- $\{x = \text{true}, \text{count} = 1, f = \lambda x : \text{Bool} . x\}$  is a record value
- operation - projecting a component annotated with a particular label

### New syntactic forms

$t ::= \dots$  *terms*  
 $\{l_i = t_i \mid i \in 1..n\}$   
 $t.l$

$v ::= \dots$  *values*  
 $\{l_i = v_i \mid i \in 1..n\}$

$T ::= \dots$  *types*  
 $\{l_i : T_i \mid i \in 1..n\}$

### Evaluation Rules

$$\frac{t_j \rightarrow t'_j}{\{l_i = v_i \mid i \in 1..j-1, l_j = t_j, l_k = t_k \mid k \in j+1..n\} \rightarrow \{l_i = v_i \mid i \in 1..j-1, l_j = t'_j, l_k = t_k \mid k \in j+1..n\}} \quad \text{E-RCD}$$

$$\frac{t_1 \rightarrow t'_1}{t_1 . l \rightarrow t'_1 . l} \quad \text{E-PROJ}$$

$$\{l_i = v_i \mid i \in 1..n\} . l_j \rightarrow v_j \quad \text{E-PROJRCD}$$

### Typing Rules

$$\frac{\text{for each } i \quad \Gamma \vdash t_i : T_i}{\Gamma \vdash \{l_i = t_i \mid i \in 1..n\} : \{l_i : T_i \mid i \in 1..n\}} \quad \text{T-RCD}$$

$$\frac{\Gamma \vdash t_1 : \{l_i : T_i \mid i \in 1..n\}}{\Gamma \vdash t_1 . l_j : T_j} \quad \text{T-PROJ}$$

### Exercise:

1. Give a concrete instance of a record of type  $\{x : \text{Bool} \times \text{Bool}, y : \text{Bool} \rightarrow \text{Bool}, z : \text{Bool}\}$ .
2. Is the above type same as the type  $\{z : \text{Bool}, x : \text{Bool} \times \text{Bool}, y : \text{Bool} \rightarrow \text{Bool}\}$ ? Justify your answer.