

CS 3110

Pattern Matching

Prof. Clarkson

Fall 2019

Today's music: Blank Space by Taylor Swift

I could show you incredible things // Magic, madness, heaven, sin

So it's gonna be forever // Or it's gonna go down in flames //

You can tell me when it's over // If the high was worth the pain

CLICKER QUESTION 1

Review

Previously in 3110:

- Expressions, definitions
- Scope
- Functions

Today:

- Data types for collections: lists, records, tuples
- **Pattern matching**

Collections

	Homogenous elements	Heterogenous elements
Fixed number of elements		Tuples and records
Unbounded number of elements	Lists	

LISTS

CLICKER QUESTION 2

OCaml lists

- **Immutable:** can't change elements
- **Singly-linked:**
 - Good for sequential access of short-to-medium length lists (say, up to 10k elements)
 - Data structures are tools: none is perfect
- **Terminology:** nil and cons (from Lisp)
- Next lecture: we'll see the implementation

RECORDS

TUPLES

Records

vs.

Tuples

by name

vs.

by position

Records and tuples

- New kind of definition: type definition
- New kinds of types: record types, tuple types

Collections

	Homogenous elements	Heterogenous elements
Fixed number of elements		Tuples and records
Unbounded number of elements	Lists	

Syntax and semantics: all in the textbook

CLICKER QUESTION 3

PATTERN MATCHING

Pattern matching

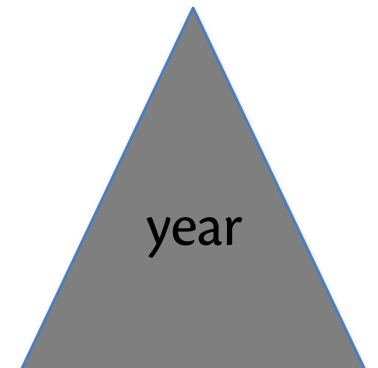
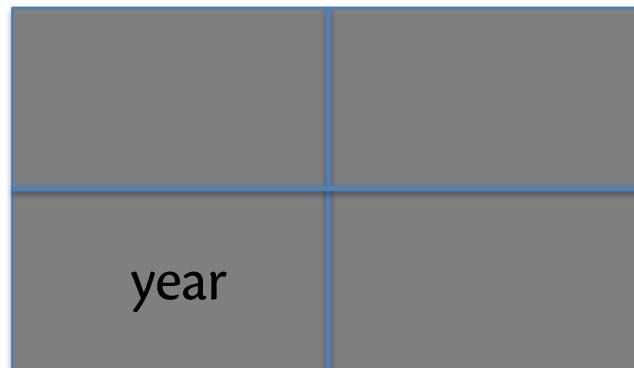
- Match shape of data
- Extract part(s) of data

Match and extract

Data:

"Ruth"	"CS"
1954	false

Patterns:



Match and extract

"Ruth"	"CS"
1954	false

Pattern does not match data

Match and extract

"Ruth"	"CS"
year 1954	false

Pattern does match data

Extracts grad year

PATTERN MATCHING ON LISTS

Demo

Pattern matching

Syntax:

```
match e with  
| p1 -> e1  
| p2 -> e2  
| ...  
| pn -> en
```

p1..pn:

pattern expressions

Semantics of pattern matching

- `[]` matches `[]` and nothing else
- `h :: t`
 - matches `2 :: []`, binding `h` to `2` and `t` to `[]`
 - matches `1 :: 3 :: []`, binding `h` to `1` and `t` to `3 :: []`
- `_` matches everything
 - underscore character, called **wildcard**
 - (it's like a blank space)

Full details in textbook

CLICKER QUESTION 4

Three ways pattern matching detects programmer error

Cf. textbook 3.1.1.4

PATTERN MATCHING IS INCREDIBLE

Demo

Upcoming events

- [Wed 5 pm] A0 due

Advice: take automatic extension only if you truly need it

- [Thu] A1 out

This is incredible.

THIS IS 3110