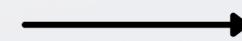




OurScheme

PROJECT 2



Outline

問題回顧

PROJECT 2

AST可視化

問題回顧

- Error Line 和 Column 如何計算
- PL測試系統是否能測EOF error
- 為何多了一個換行字元

問題回顧

Error Line 和 Column 如何計算

```
(1 2 3 )\n
```

```
"erro here! \n
```

```
(4 5 6)\n
```

→ERROR (no closing quote) : END-OF-LINE encountered at Line 1 Column 13

```
(1 2 3 ) ( \n
```

```
"erro here! \n
```

```
(4 5 6)\n
```

→ERROR (no closing quote) : END-OF-LINE encountered at Line 2 Column 13

```
(1 2 3 ) ; \n
```

```
"erro here! \n
```

```
(4 5 6)\n
```

→ERROR (no closing quote) : END-OF-LINE encountered at Line 1 Column 13

問題回顧

PL測試系統是否能測EOF error



but

Windows (CMD/PowerShell):

Ctrl + Z

Linux / macOS (Unix Shell, etc.):

Ctrl + D

The screenshot shows a PL testing system interface with two test cases:

- hello world.in (3/3)**:
 - Program Output: hello world
 - Expected Output: hello world
 - Test Result: Passed (green checkmark)
 - Total: 3, Passed: 1
- 1.1.2.in (2/3)**:
 - Program Output: hello world
 - Expected Output: Welcome to OurScheme!
 - Test Result: Failed (red X)
 - Total: 3, Passed: 1

問題回顧

為何多了一個換行字元

你所看到的

PL可視化系統做的

輸入程式碼

(1 2 3)|

(1 2 3)\n

Project 2

- primitive expressions
- define
- Conditional processing
- Sequencing
- features
- error
- eqv vs equal

Project 2

primitive expressions

Welcome to OurScheme!

```
> (+ 3 4)  
7
```

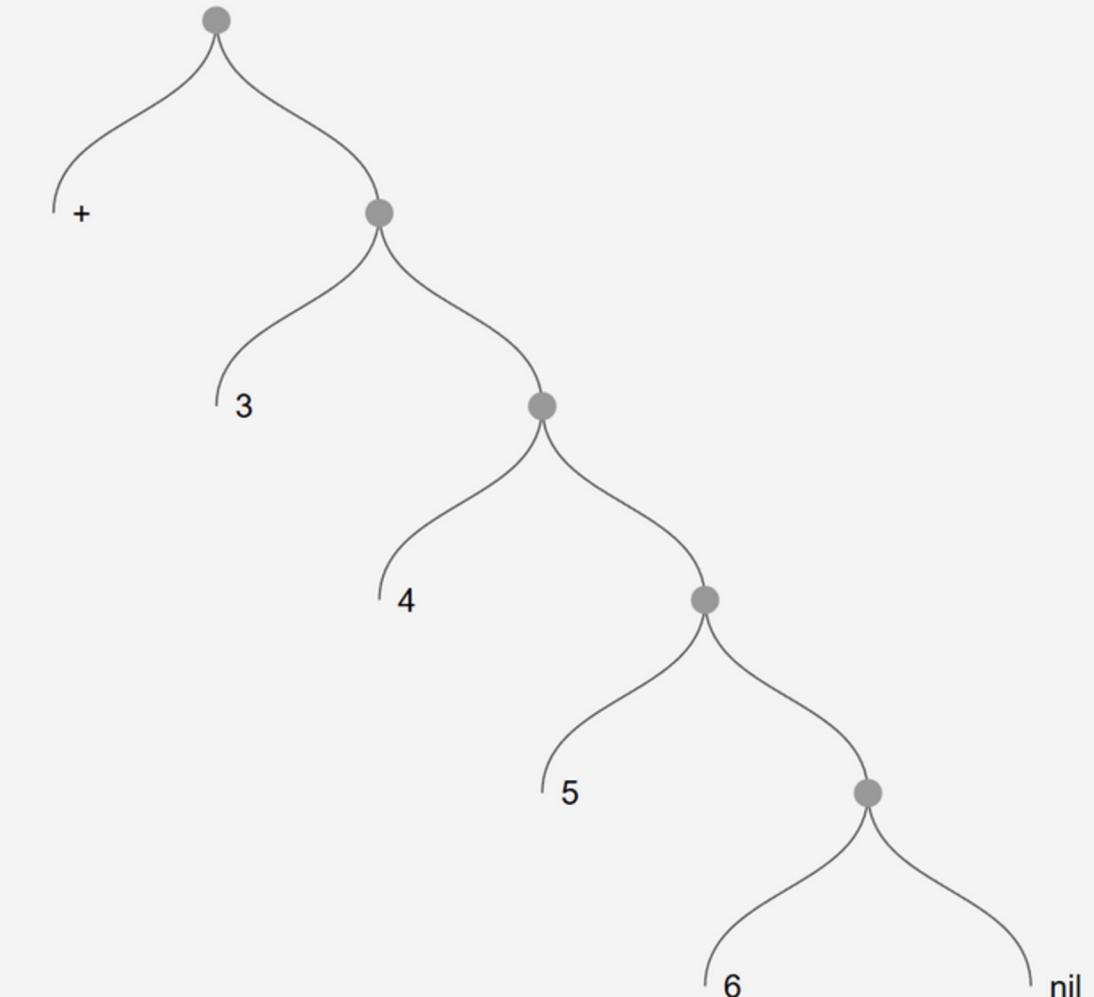
```
> (* 2 5)  
10
```

```
> (/ 10 2)  
5
```

```
> (/ 5 0)  
ERROR (division by zero) : /
```

```
>
```

```
(+ 3 4 5 6)
```



Project 2

define

Welcome to OurScheme!

```
> (define a 5)  
a defined
```

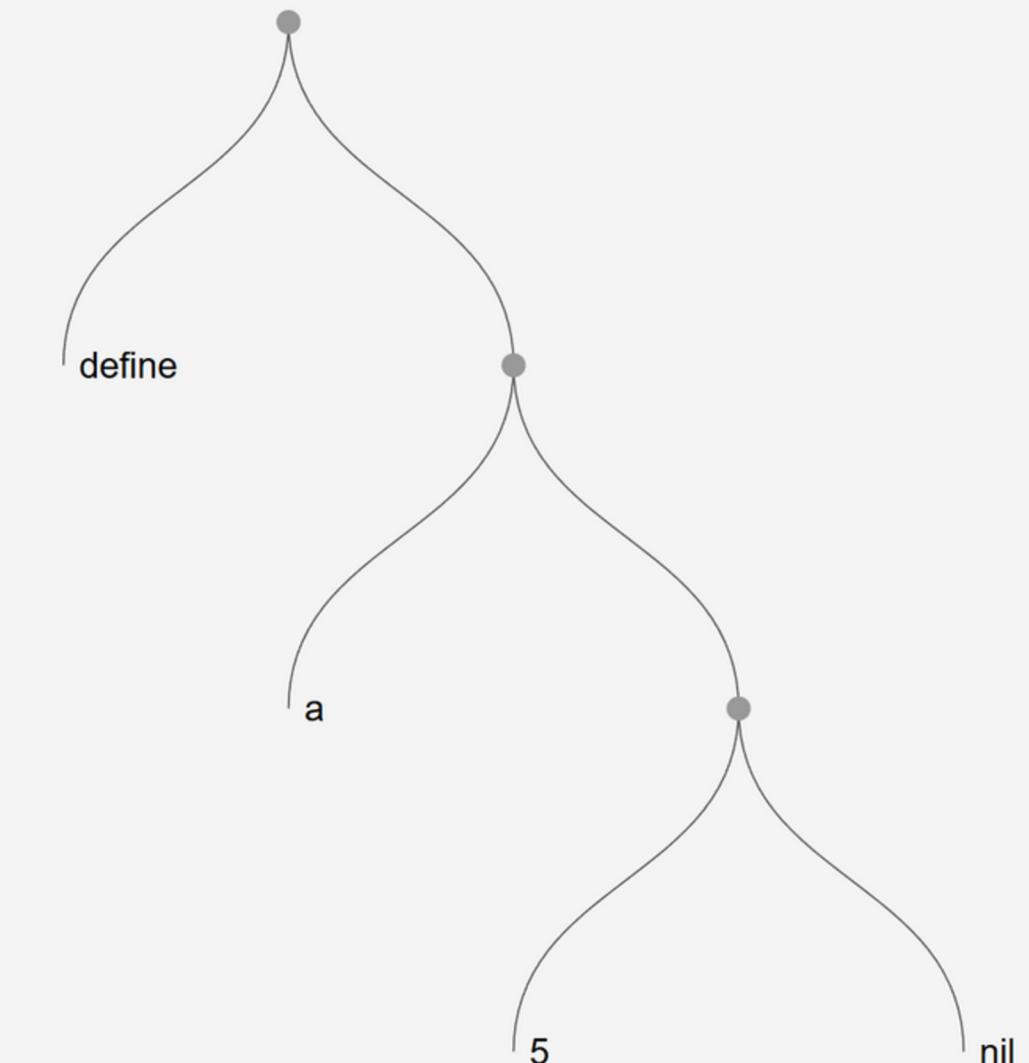
```
> a  
5
```

```
> (+ a 3)  
8
```

```
> (define cons 10)  
ERROR (DEFINE format) : ( define  
  cons  
  10  
)
```

```
>
```

```
(define a 5)
```



Project 2

Conditional processing (if & cond)

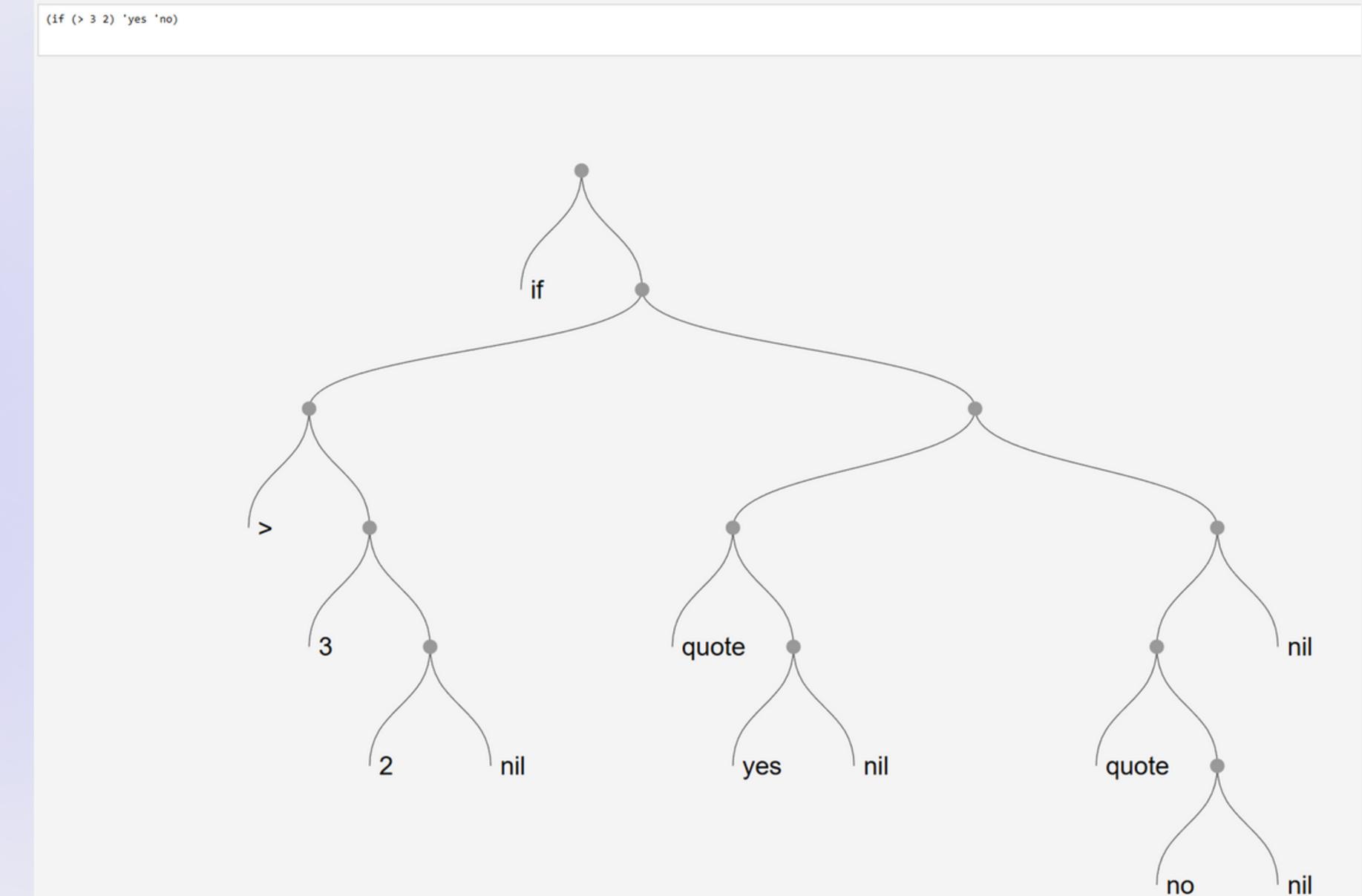
Welcome to OurScheme!

```
> (if (> 3 2) 'yes 'no)  
yes
```

```
> (if (< 1 0) 'negative 'positive)  
positive
```

```
> (cond  
  ((> 3 4) 'bad)  
  ((> 4 3) 'good)  
  (else "What happened?"))  
good
```

```
> (if #f 3)  
ERROR (no return value) : ( if  
  nil  
  3  
)
```

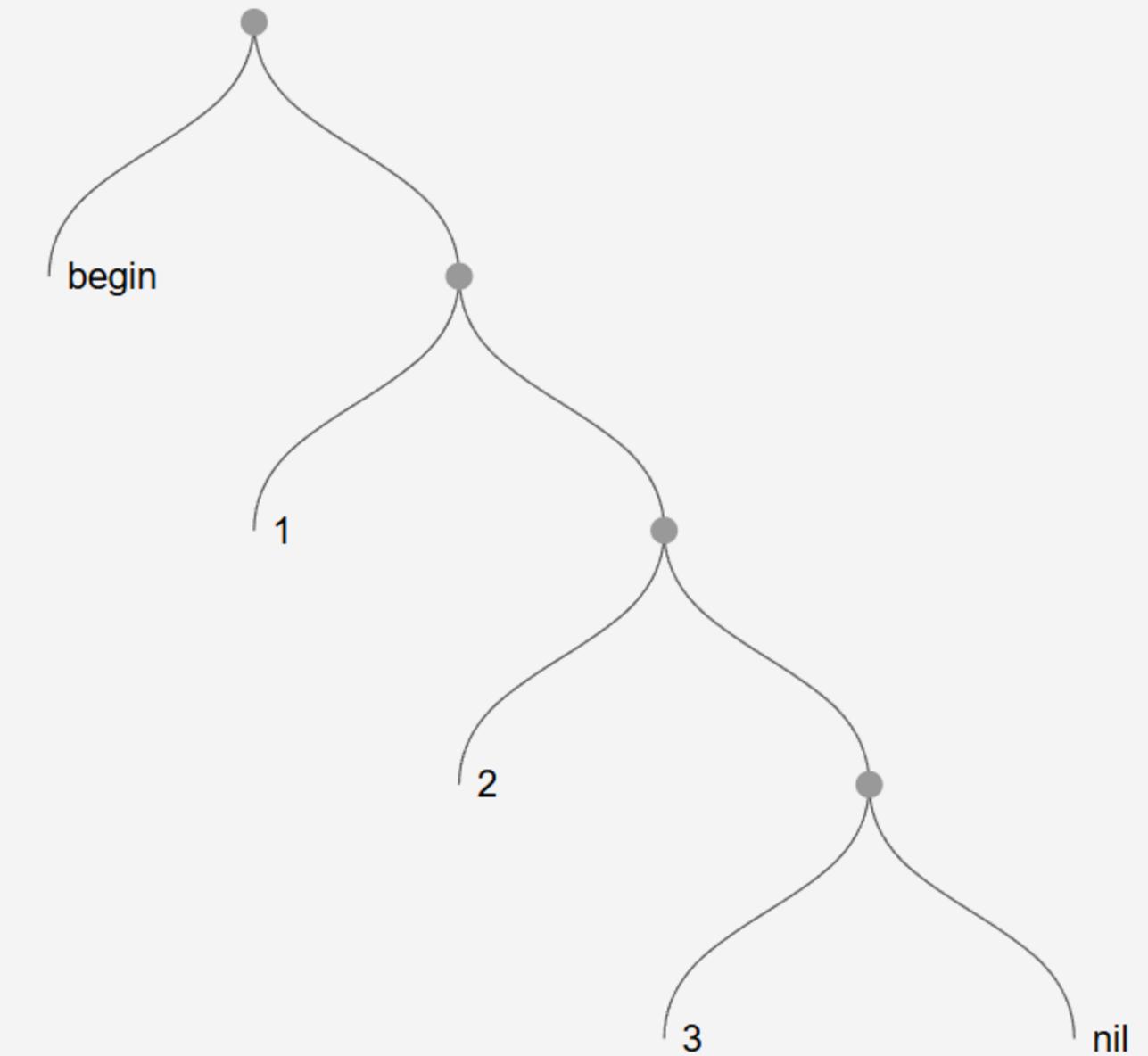


Project 2

Sequencing (begin)

Welcome to OurScheme!

```
> (begin 1 2 3)  
3
```



Procedure



建構子

Constructors

cons (2) - 建立點對 (dotted pair)

list (≥ 0) - 建立列表 (list)



繞過

Bypassing Evaluation

quote (1) 或 ' (1)

防止 S-expression 被計算



綁定

The binding of a symbol

define (2)

不可重定義內建函數



取值

Part accessors

car (1) - 取第一個元素

cdr (1) - 取剩餘部分



判斷

Primitive predicates

所有函數僅接受 1 個參數

atom?, pair?, list?, integer?, string? 等

features



操作

Basic arithmetic, logical,
and string operations

數學運算: +, -, *, / (至少 2 個參數)

邏輯運算:not (1), and (≥ 2), or (≥ 2)

比較運算:>, \geq , <, \leq , =

字串處理:string-append, string>?, string<?



相等

Equivalence tester

eqv? (2) - 是否為相同原子

equal? (2) - 結構是否相同



組合

Sequencing and
functional composition

begin (≥ 1) - 順序執行多

個表達式，回傳最後的值



條件

Conditionals

if (2 or 3) - 單一條件判斷

cond (≥ 1) - 多條件判斷

非NIL, #f 即 True



清空

Clean environment

clean-environment (0) - 清除

所有使用者定義的變數

Project 2

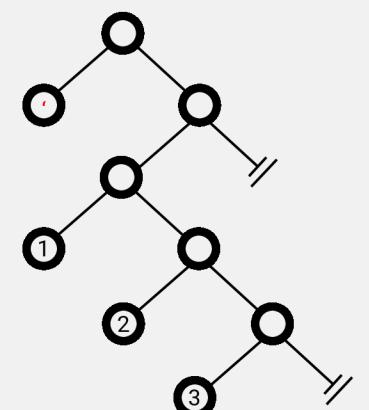
eqv vs equal

測試	eqv?	equal?	說明
([test] 3 3)	#t	#t	數值相同
([test] 'a 'a)	#t	#t	符號唯一
([test] "hello" "hello")	nil	#t	字串是不同物件但內容相同
([test] '(1 2 3) '(1 2 3))	nil	#t	list 是不同物件但內容相同
([test] x x)	#t	#t	變數指向相同物件

address & Immutable

Address	Value
0x00	01001010
0x01	10111010
0x02	01011111
0x03	00100100
0x04	01000100
0x05	10100000
0x06	01110100
0x07	01101111
0x08	10111011
...	...
0xFE	11011110
0xFF	10111011

Traversal



錯誤處理

錯誤處理

錯誤類型	發生條件	對應錯誤訊息	舉例
未預期的 Token	碰到不符合文法的token (如 . 開頭的錯誤輸入)	ERROR (unexpected token) : atom or '(' expected when token at Line X Column Y is >>...<<	(1 2 .)
缺少右括號)	S-Exp 未完整封閉，遇到 . 或) 時語法錯誤	ERROR (unexpected token) : ')' expected when token at Line X Column Y is >>...<<	(1 2 . 3 4)
未關閉字串	遇到 " 開頭但沒有對應 " 結束，且換行	ERROR (no closing quote) : END-OF-LINE encountered at Line X Column Y	("hello)
檔案結束 (EOF)	讀取輸入時沒有 (exit) ，但檔案提前結束	ERROR (no more input) : END-OF-FILE encountered	-

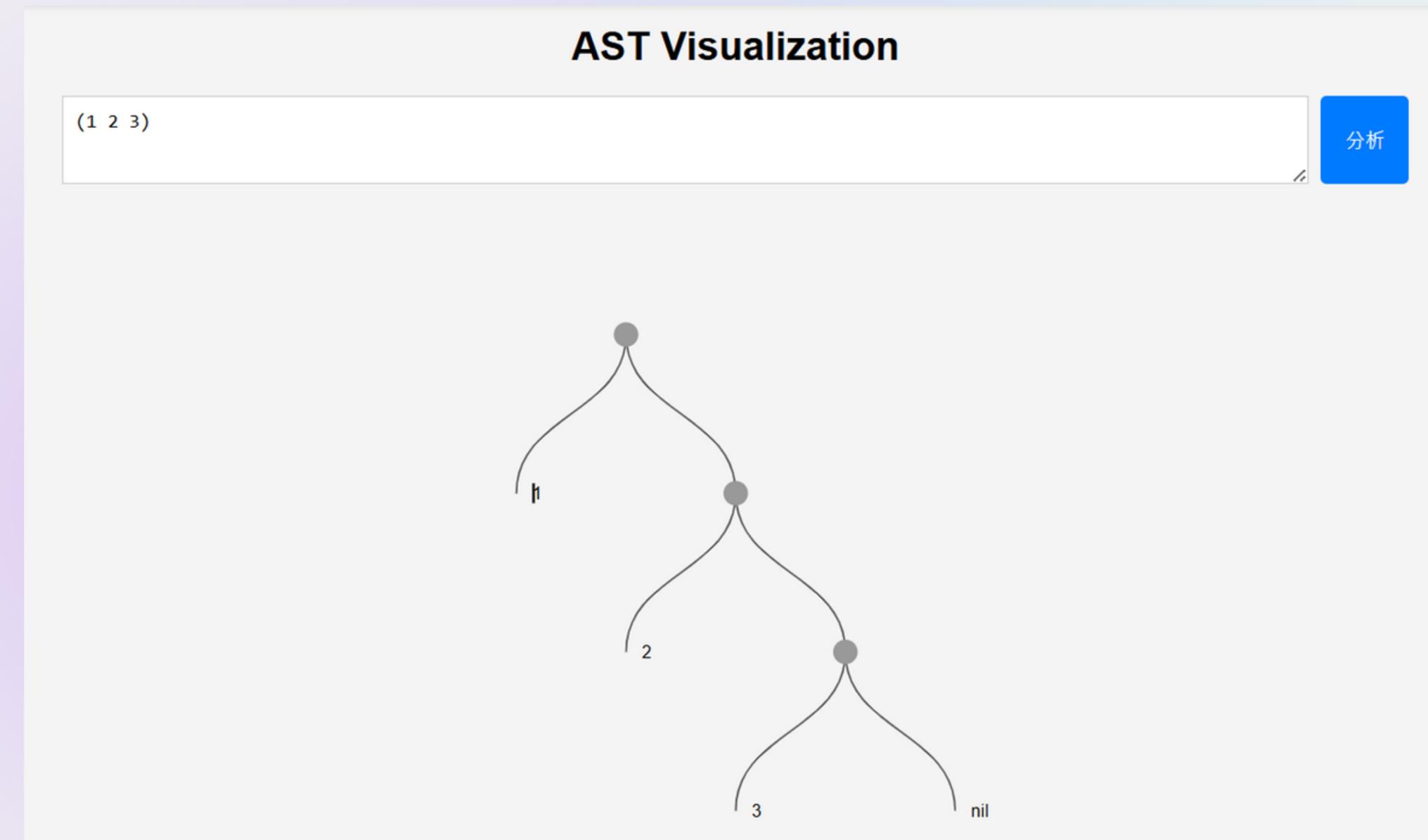
錯誤處理

錯誤類型	發生條件	對應錯誤訊息	舉例
非列表結構 (Non-list)	cons 的結構不正確	ERROR (non-list) : (cons 3 . 5)	(cons 3 . 5)
參數數量錯誤	函數的參數數量錯誤	ERROR (incorrect number of arguments) : cons	(cons 3)
錯誤的運算對象	car、cdr 作用於非列表的對象	ERROR (car with incorrect argument type) : 3	(car 3)
嘗試執行非函數物件	執行的對象不是函數	ERROR (attempt to apply non-function) : 3	(3 5)

錯誤處理

錯誤類型	發生條件	對應錯誤訊息	舉例
條件語句無返回值	if 或 cond 沒有對應的返回結果	ERROR (no return value) : (if nil 3)	(if #f 3)
未綁定的符號 (Unbound Symbol)	變數未定義	ERROR (unbound symbol) : noSuchThing	(cons noSuchThing noOtherThingEither)
運算錯誤 (如除以零)	/ 運算時除數為 0	ERROR (division by zero) : /	(/ 30 5 0)
define 格式錯誤	define 定義變數時格式錯誤	ERROR (DEFINE format) : (define a)	(define a)
cond 格式錯誤	cond 的結構錯誤	ERROR (COND format) : (cond)	(cond)

AST可視化



<https://cycu-ice-pl.github.io/website/#/Visualize>

完成人數

3/25統計

Project 1 : 42人

Project 2: 8人

Project 3 : 3人

Project 4 : 2人



祝各位順利~