CSC488S/CSC2107S Compilers and Interpreters **Winter 2012/2013**

Mid Term Test Solution

1. [20 marks] Something like:

ndigit $\rightarrow$ 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
digit $\rightarrow$ 0 | ndigit
group $\rightarrow$ **,** digit digit digit
number $\rightarrow$ $$*^{*}$(0 | ndigit (λ | digit | digit digit | group*) (λ | **.** digit digit)

Where λ is the empty string and * is the Kleene star.

2. [20 marks]

The grammar is AMBIGUOUS, hence not LL(anything)
Predict set conflict on E $\rightarrow$ λ

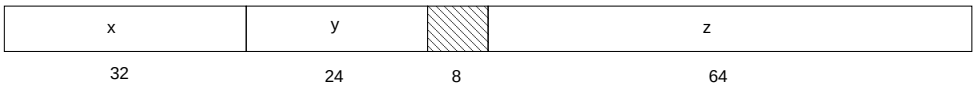
					Predict Set
9	E	$\rightarrow$	a	B	{ a }
10		$\rightarrow$	b	A	{ b }
11		$\rightarrow$	λ		{ a , b , $ }

Most common problem was not computing the Predict Set for E $\rightarrow$ λ correctly.

3. [20 marks]

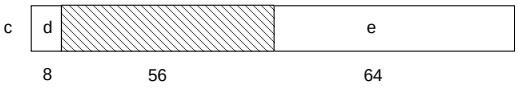
First map each case

case 1

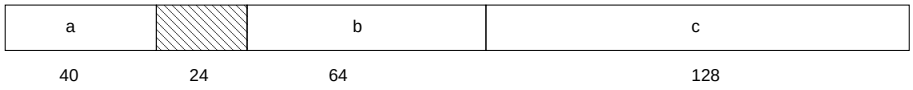


length: 128 alignment: 64

case 2



length: 128 alignment: 64

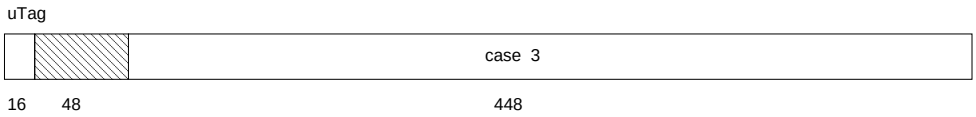


length: 256 alignment: 64

case 3

length: 448 alignment: 64

Case 3 is the largest so it determines the size of the union. Finally map the entire union



length: 512 alignment: 64

The most common problems were failing to map the entire union and laying out the union cases sequentially rather than overlapping them.

4. [20 marks]

Fragment A

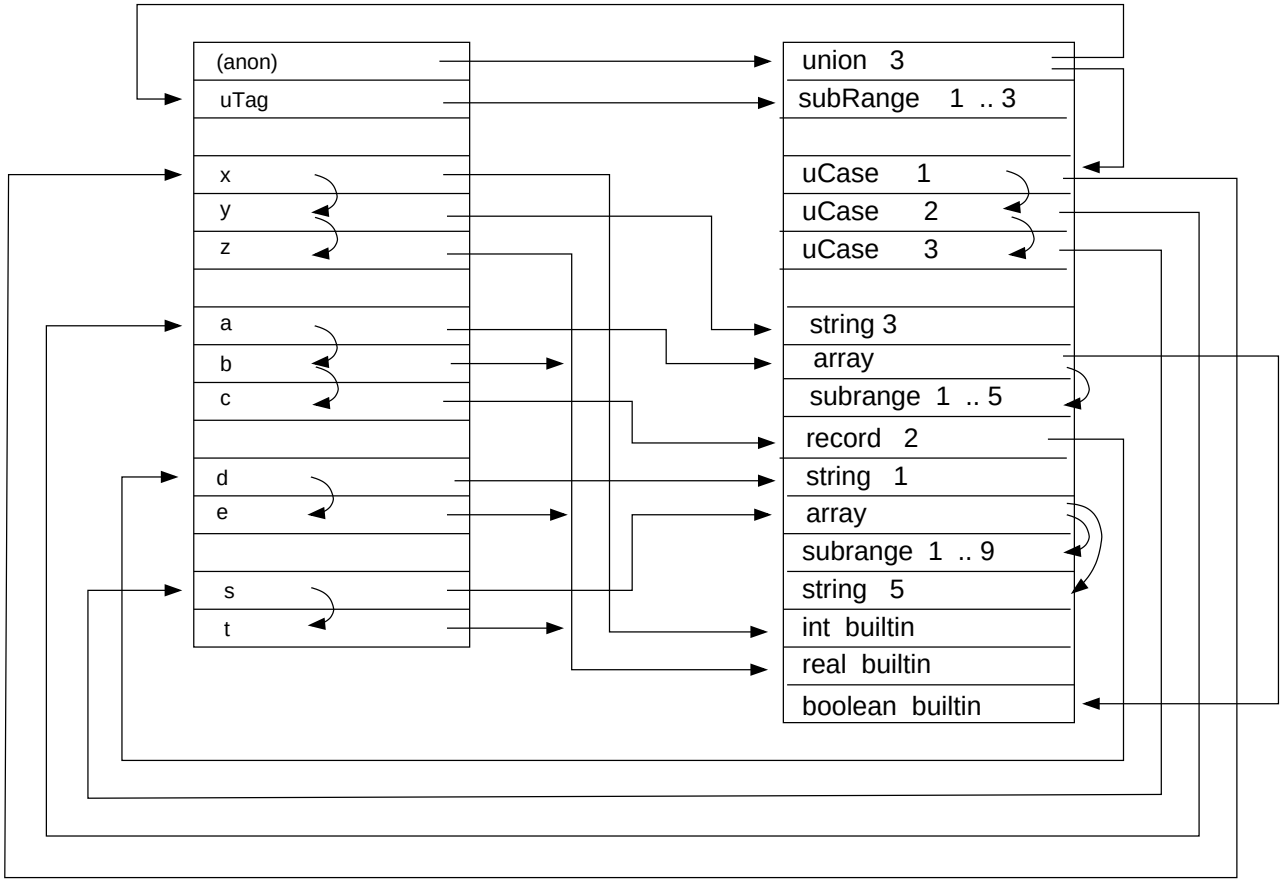
1 Check that method with this signature not already declared
2 Check that I is not already declared in this scope.
Check that 0 can be assigned to I
3 Check that I is declared
Check the I < 10 is a legal comparison
4 Check that J is not already declared in this scope.
Check that - can be assigned to J
5 Check that I is declared
Check that ++ can be applied to I
7 Check that System is defined and is a class
Check that System has a field out
Check that System.out.println is defined
Check that a System.out.println that takes an int argument exists
Check that I is declared

Fragment B

1 Check that K is not already declared in this scope
Check that 0 can be assigned to K
Check that K is declared
Check that data is declared
Check that data has a field length
Check that K < data.length is a legal comparison
Check that K is declared
Check that ++ can be applied to K
2 Check that data is declared
Check that data is a 1-dimensional array
Check that K is declared
Check that K is a valid subscript for data [ ]
Check that target is declared
Check that data[K] == target is a legal comparison
3 Check that index is declared
Check that K is declared
Check that K can be assigned to index
4 Check that break is inside a loop

Curiously, many people missed checking the variable target on line 2

5. [20 marks]


(anon)
uTag
x
y
z
a
b
c
d
e
s
t
union 3
subRange 1 .. 3
uCase 1
uCase 2
uCase 3
string 3
array
subrange 1 .. 5
record 2
string 1
array
subrange 1 .. 9
string 5
int builtin
real builtin
boolean builtin