## 422014 相铸明

## Midterm Exam for Programming Language by Kun-Yuan Hsieh

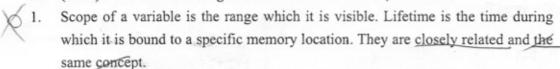
- A. (60%) Read the following sentence. Mark O if true, X if false.
- Scope of a variable is the range which it is visible. Lifetime is the time during which it is bound to a specific memory location. They are closely related and the same concept.
- X 2. BNF is not context-free.
- Static binding means the binding occurs before run time and remains unchanged in execution
- 4. If two variables have the same type name are compatible, we call it name type compatibility, such as C.
- $\bigcirc$  5. In the following grammar:  $\langle \exp \rangle \rightarrow \langle \exp \rangle + \langle id \rangle$  |  $\langle id \rangle$ , the operator + performs a left-to-right associativity.
- Compilation translates the high-level program to machine code while interpretation translates it to an intermediate code.
- We call a pointer dangling if it points to a heap-dynamic variable that has been deallocated.
- Operator generated in the lower-level in the parse tree has precedence over the higher-level ones.
- 9. The derivation of "A = B + C \* A" bellow is a left-most derivation which is according to an unambiguous grammar.

## <assign>

- → <id>= <exp>
- → A = <exp>
- → A = <exp> + <exp>
- → A = <id> + <exp>
- → A = B + <exp>
- → A = B + <exp> \* <exp>
- → A = B + <id> \* <exp>
- → A = B + C \* <exp>
- → A = B + C \* <id>
- → A = B + C \* A
- 10. Bottom-up parsing is often called shift-reduce algorithms because it move the next token to the parser stack and replacing the RHS on the top of the stack with corresponding LHS.

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○ 5. In the following grammar:
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→ A = B + <exp>

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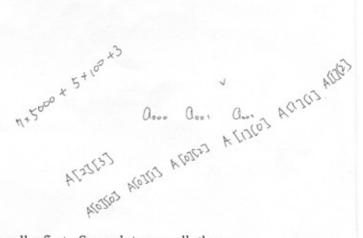
→ A = B + C \* <exp>

→ A = B + C \* <id>

→ A = B + C \* A

10. Bottom-up parsing is often called shift-reduce algorithms because it move the next token to the parser stack and replacing the RHS on the top of the stack with corresponding LHS. 11. In the following code, variable i in test() function is a stack-dynamic variable, while i in main() is NOT because the storage of variable i in main() is bound during run time and remains unchanged in execution.

```
#include <stdio.h>
int count;
main() {
   int i;
   for (i=0; i<=10; i++){
      test();
   static int count = 0;
   count = count + 1;
```



12. Garbage collection invalidates all memory cells first. Second traces all the pointers to mark valid ones. After, all cells that have not been marked as valid are an anz aus returned to the available space.

B. (40%) Read select following sentence and select a correct answer.

any any an; If a three-dimension array A[100][50][20] is implemented by column major and allocation. & A[0][0][0] = 1200. & A[3][5][7]Ou ar ans an an an

36703 a.

36507 b.

3107 c.

3108

C 2. -a) If static scope, what's X2 after execution?

5

b. . 10

15 c.

NULL d.

-b) If dynamic scope, what's X2 after execution?

5 a.

10 b.

15

d. NULL

```
int X=10;
int X2;
A(){
     return X;
}
B(){
      int X = 5;
      return A() + X;
X2 = B();
```

main(){

6	3.	Which of the following characteristic DOES NOT affect a programming
		language's readability and writability?
		a. Operation overloading
		b. Orthogonality
		c. Sub program
		d. Reliability
C	4.	Variables that are allocated and deallocated by some statements during run-time,
		they are:
		a. static variables
		b. stack-dynamic variables
		c. explicit heap-dynamic variables
1		d. implicit heap-dynamic variables
d	5.	Which of the following grammar allows top-down parsing?
		a. A → BaA; B → bAb disallows
		b. $A \rightarrow aAB; B \rightarrow Ab$
		c. $A \rightarrow BaA; B \rightarrow c$
		d. $A \rightarrow AB; B \rightarrow b$
	6.	Which of the following statements about syntax analysis is NOT true?
		<ul> <li>Syntax analysis is broken into two distinct parts: lexical analysis and parsing</li> </ul>
		b. Lexical analysis extracts lexemes and produce the corresponding tokens
		c. Using context-free grammar, we can perform type-checking during parsing.
		d. The hierarchical syntactic structure the grammar described is called parse
		tree, which is the output of a parser.
C	7.	Which of the following data type is NOT usually being concerned as primitive?
		a. Integer
		b. Character
		c. Pointer
		d. Boolean