Programming Languages　HW 1

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1.4　每一種程式語言的特性和使用範圍都是不一樣的，用一種程式語言去模擬另一種程式語言并不是不可能的事情，但是會花費額外的成本，時間和精力，只用一種語言去解決所有程序問題是非常沒有效率的。程式語言被發明出來是爲了解決特定的問題，比如 PHP 和 C 語言針對的領域是不一樣的，不太會有人想用 C 語言去做 web 開發，這時候針對實際環境去選擇正確的程式語言才是正確的方式，而不是用一門語言嘗試解決所有問題。

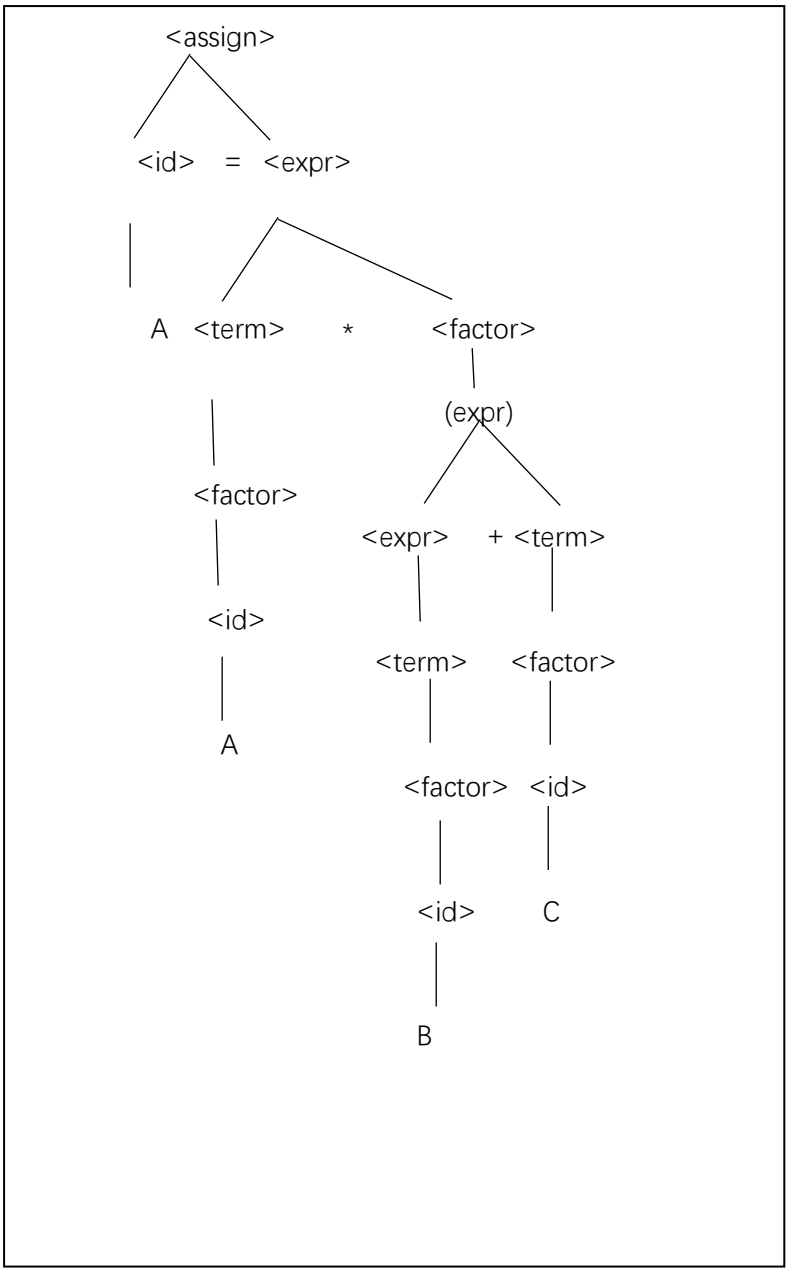
1.18　單行注釋的優點是，使用字符少，適合快速少量的注釋內容，只針對單行生效，不會影響到其他範圍。缺點是不適合注釋大量內容。

多行注釋的優點是，可以用較少的字符注釋大量內容。比較適合成段多行內容注釋。缺點是如果少量注釋便會顯得很繁瑣。如果程序中含有多個注釋，此時缺少開始或者結束符會造成中間代碼部分被錯誤注釋。

2.14　對於無類型的支持者來説，無類型的好處有，比較靈活和簡潔的語法。對於反對者來説，無類型造成無法使用類型檢查在不執行程式時驗證數據的完整性。而且使用有類型的語言可以使執行效率更快。

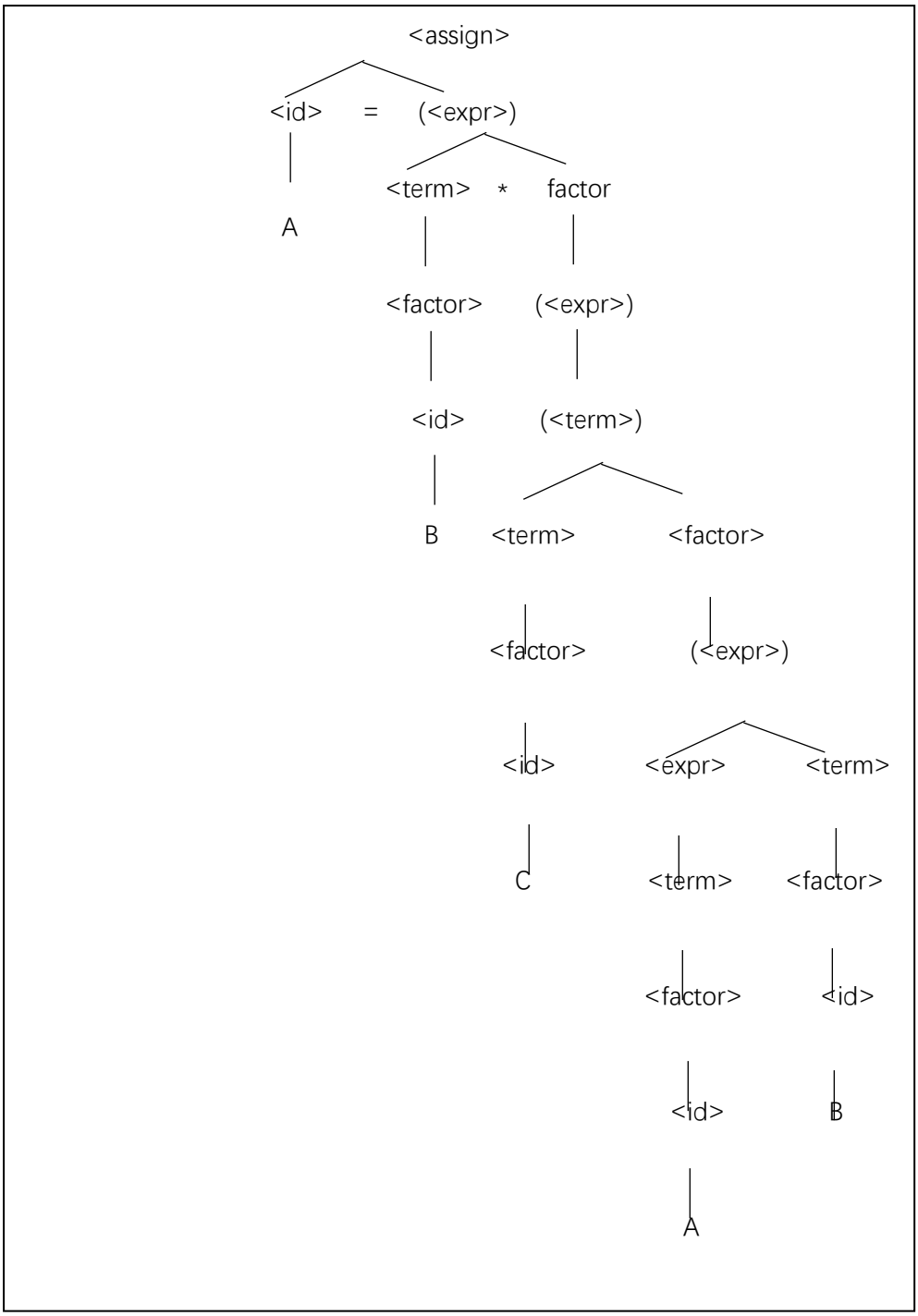
3.4　<assign> -> <id> = <expr>
<id> -> A | B | C
<expr> -> <expr> + <term> | <term>
<term> -> <term> * <factor> | <factor>
<factor> -> (<expr>) | <id> | <id> ++ | <id> - -

3.7 c.　A = A * (B + C)
<assign> => <id> = <expr>
=> A = <expr>
=> A = <term> * <factor>
=> A = <factor> * <factor>
=> A = <id> * <factor>
=> A = A * <factor>
=> A = A * (<expr>)
=> A = A * (<expr> + <term>)
=> A = A * (<term> + <term>)
=> A = A * (<factor> + <term>)
=> A = A * (<id> + <term>)
=> A = A * (B + <term>)
=> A = A * (B + <factor>)
=> A = A * (B + <id>)
=> A = A * (B + C)


<assign>
<id> = <expr>
A <term> * <factor>
<factor>
(expr)
<id>
<expr> + <term>
A
<term> <factor>
<factor> <id>
<id> C
B

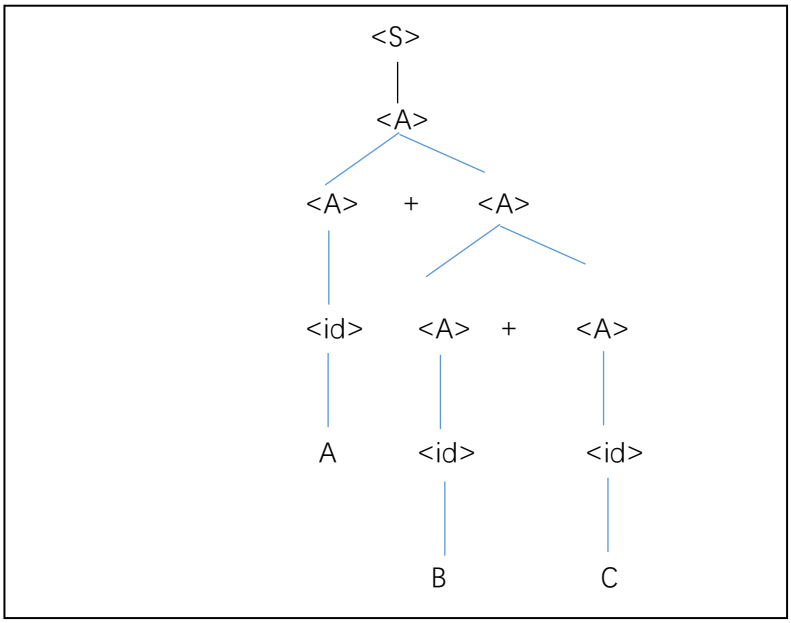
3.7 d. A = B * (C * (A + B))

<assign> => <id> = <expr>
=> A = <term> * <factor>
=> A = <factor> * <factor>
=> A = <id> * <factor>
=> A = B * <factor>
=> A = B * (<expr>)
=> A = B * (<term>)
=> A = B * (<term> * <factor>)
=> A = B * (<factor> * <factor>)
=> A = B * (<id> * <factor>)
=> A = B * (C * <factor>)
=> A = B * (C * (<expr>))
=>A = B * (C * (<expr> + <term>))
=>A = B * (C * (<term> + <term>))
=>A = B * (C * (<factor> + <term>))
=>A = B * (C * (<id> + <term>))
=>A = B * (C * (A + <term>))
=>A = B * (C * (A + <factor>))
=>A = B * (C * (A + <id>))
=>A = B * (C * (A + B))

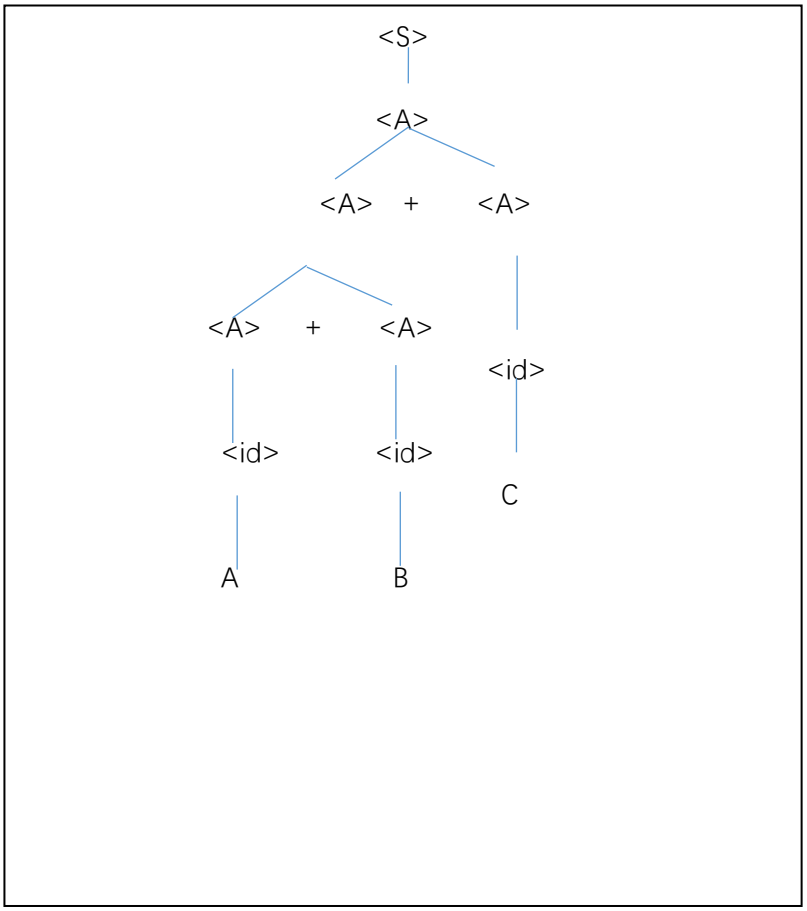

<assign>
<id>
=
(<expr>)
A
<term>
*
factor
<factor>
(<expr>)
<id>
(<term>)
B
<term>
<factor>
<factor>
(<expr>)
<id>
<expr>
<term>
C
<term>
<factor>
<factor>
<id>
<id>
B
A

3.8 如果是 A+B+C 的話會是下面所示的有兩種 parse tree 表示

Type-A



Type-B



3.11 a.babb c. bbaaaaab

3.23 b. b = (c + 10) / 3 { b > 6 }
((c + 10) / 3) > 6
c + 10 > 18
c > 8

C a = a + 2 * b – 1 { a > 1 }
a + 2 * b – 1 > 1
2 * b > 2 – a
b > (2 - a) / 2

5.6 a i. sub1 ii. sub1 Iii. main
b i. sub1 ii. sub1 Iii. sub1

5.8 Sub1: sub1(a,y,z) main(x)
Sub2: sub1(y) sub2(a,b,z) main(x)
Sub3: sub3(a,x,w) main(y,z)