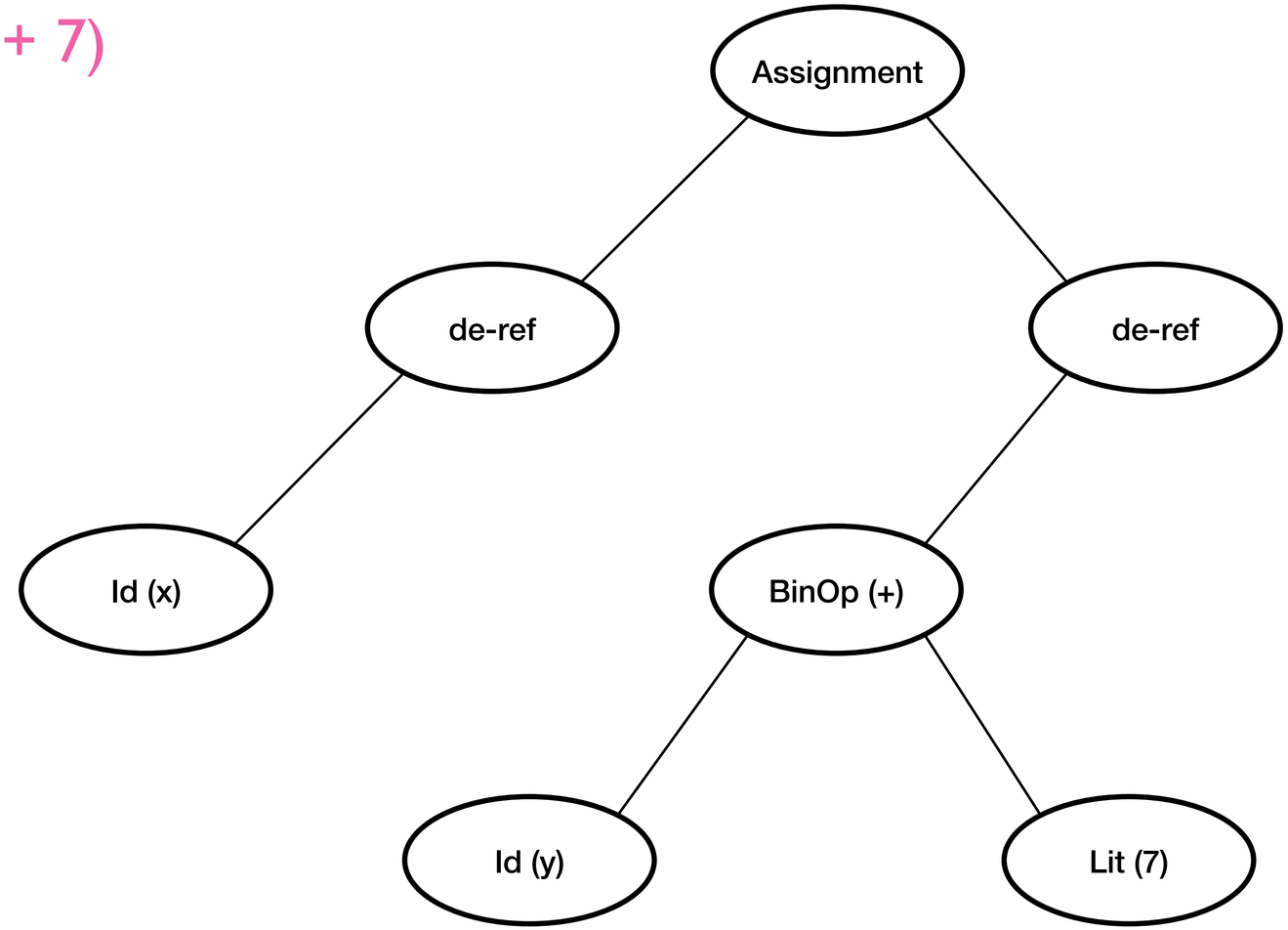
Pointer Codegen Example

code generation (assembly)

- Code generation in assembly is easy: keep the same CodeObject, but switch whether temporary is an l-val or an r-val

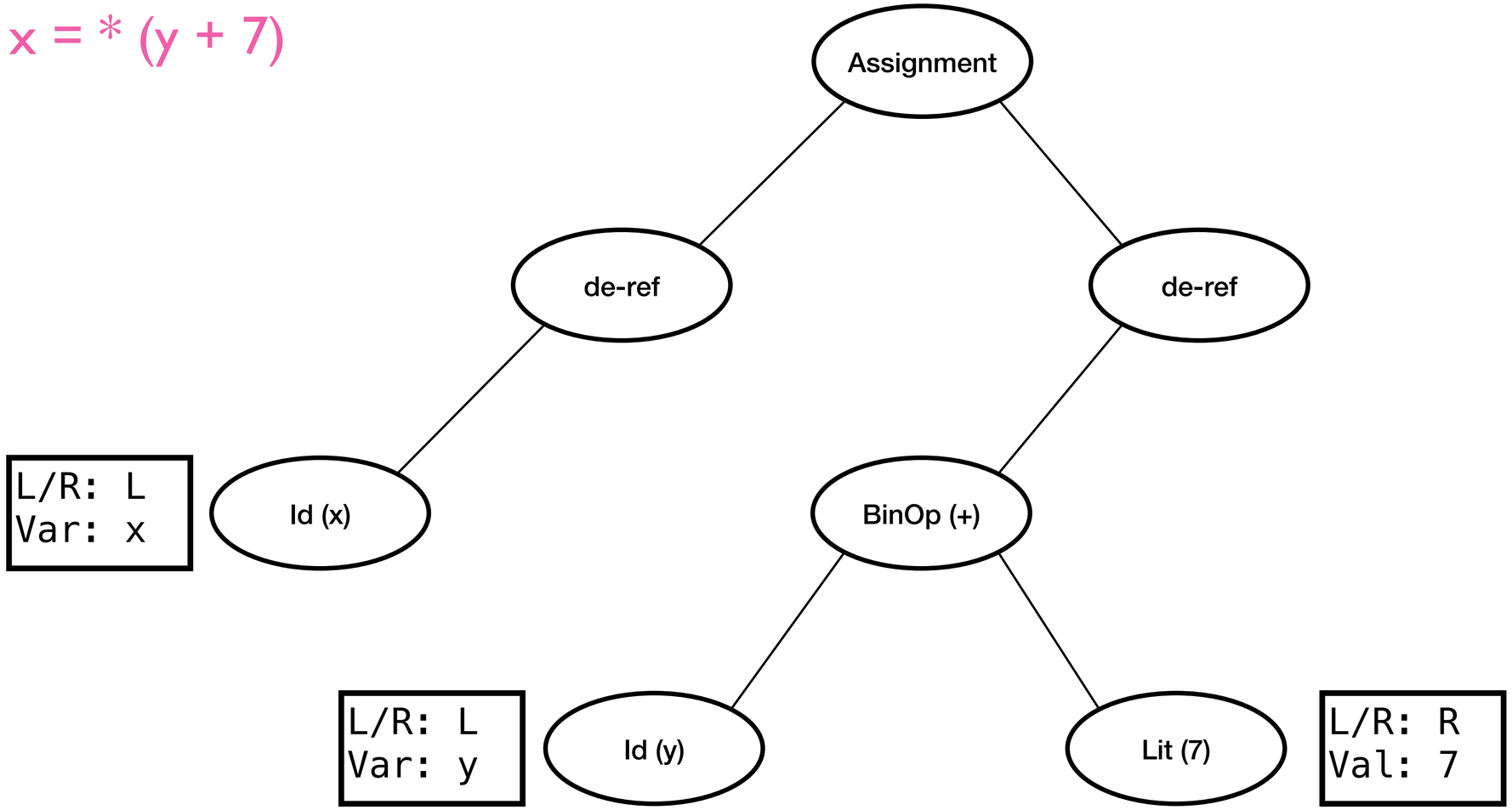
code generation (assembly)

- * x = * (y + 7)



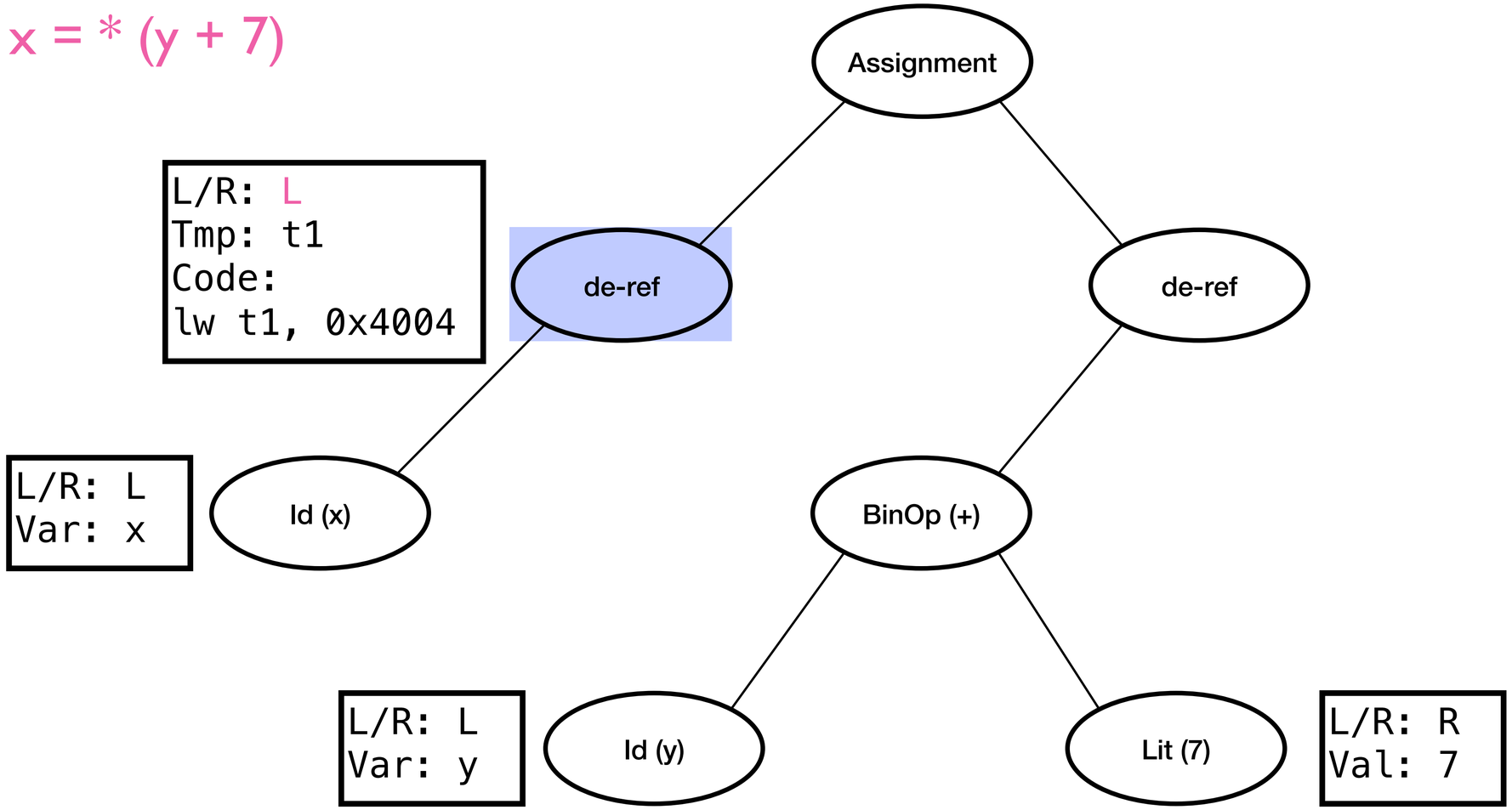
code generation (assembly)

- * x = * (y + 7)



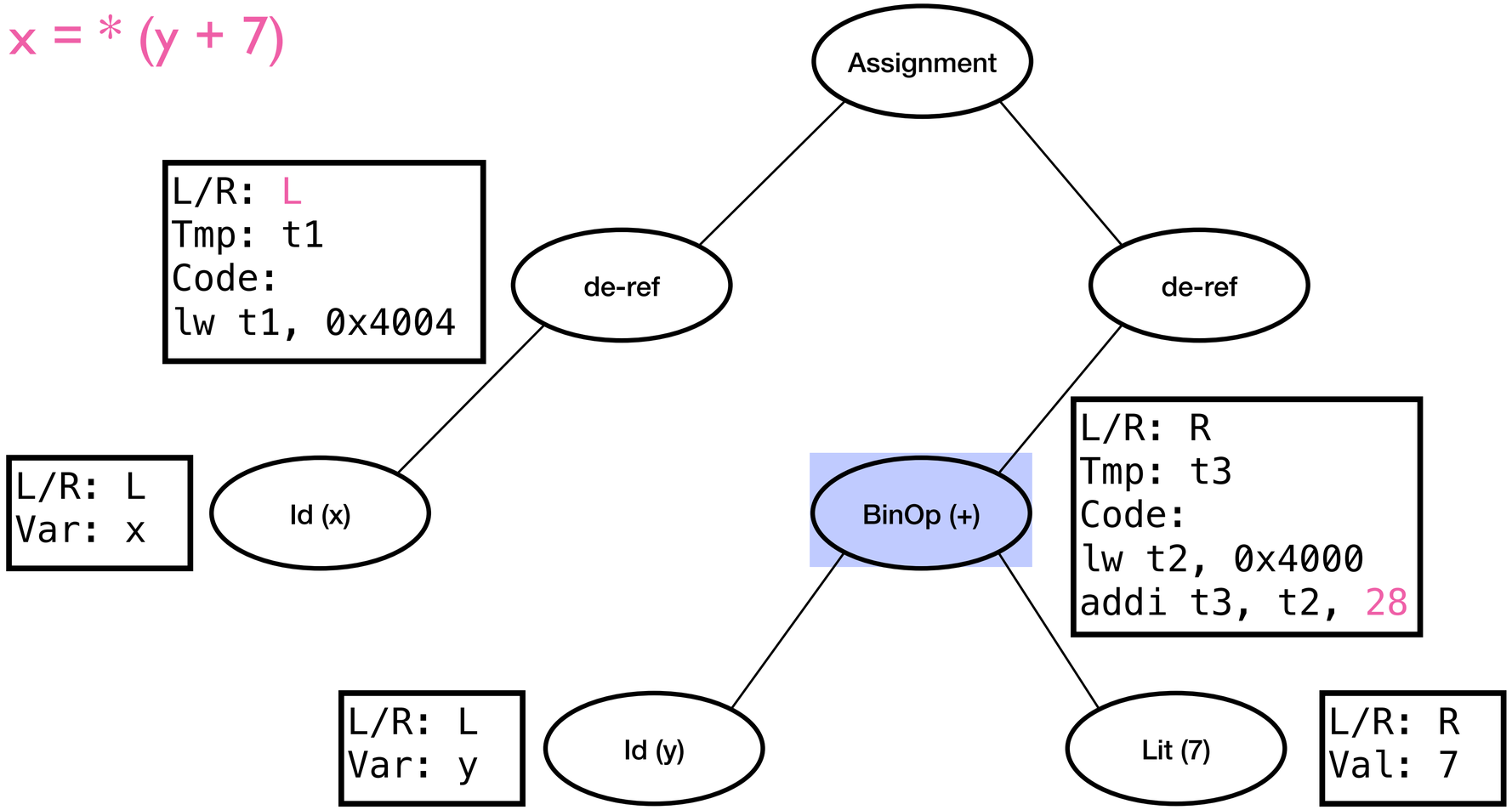
code generation (assembly)

- * x = * (y + 7)



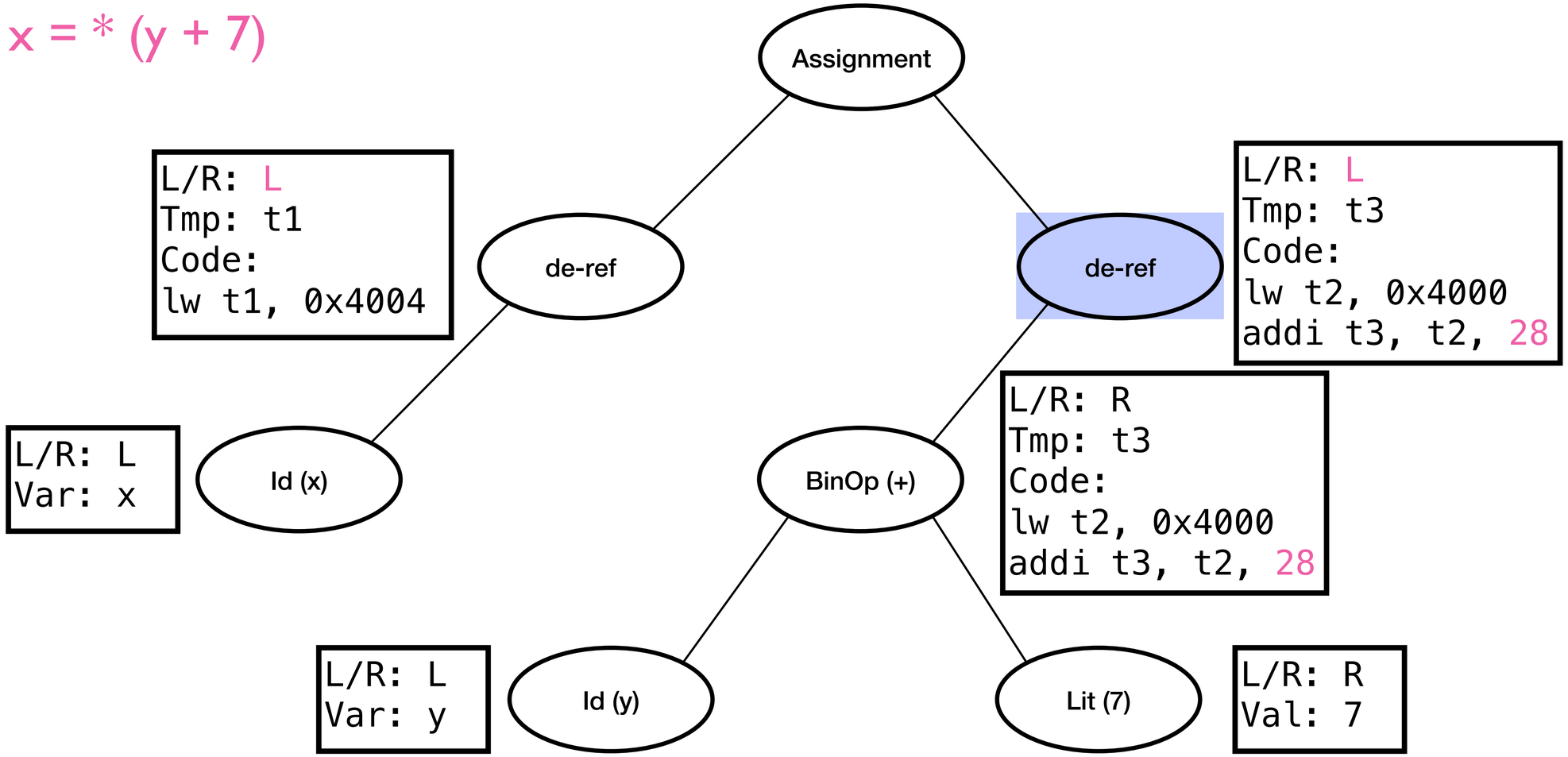
code generation (assembly)

- * x = * (y + 7)



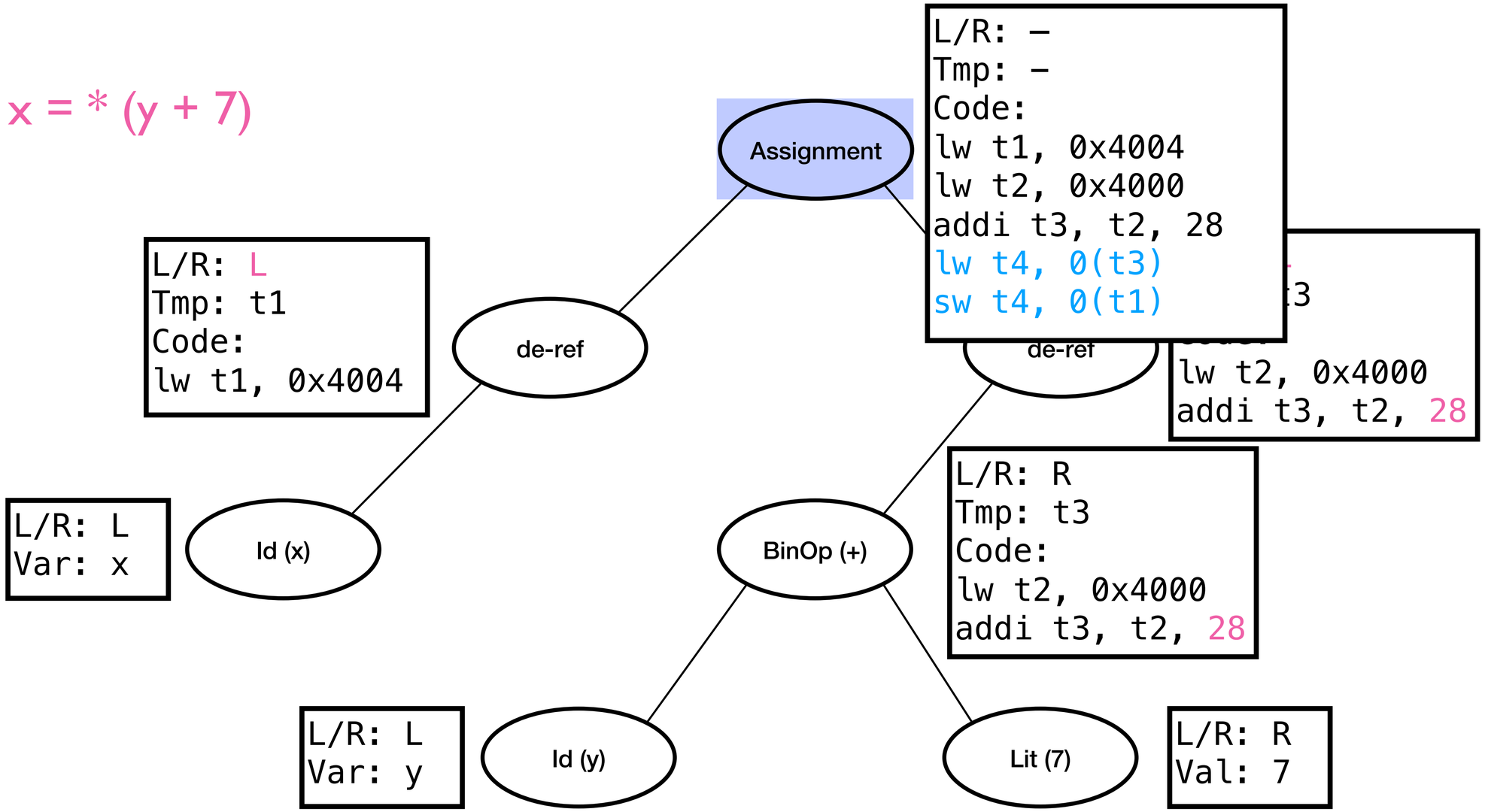
code generation (assembly)

- * x = * (y + 7)



code generation (assembly)

- * x = * (y + 7)



code generation (IR)

- Code generation for IR is similar
- Track whether IR temporary holds an l-value or an r-value (e.g., use '$' as prefix for r-value, '@' as prefix for l-value)
- Introduce two new IR nodes:
  - ADDROF a, b : store the address of operand b in a (if b is a variable, a holds the variable address; if b is an l-value temporary, a *is* the temporary, just as an r-value)
  - DEREF a, b : store the value of operand b in a *as an address* (if b is a variable or an l-value temporary, load from b and store the result in a as an l-value; if b is an r-value temporary, a *is* the temporary, just as an l-value)

register allocation

- Now that we have pointers, we have aliasing!
- Simple solution: treat all locals/globals as aliased to each other: cannot stay in registers. Write back on every store, free after every load
- Slightly more complicated: only variables that have ever had an ADDROF operation applied to them can be aliased
- More complex: perform **pointer analysis** (stay tuned!)

next: memory allocation