

School of Mathematical and Computational Sciences
Indian Association for the Cultivation of Science

Compiler Construction: COM 5202

Tutorial X (25 March 2026)

M. Sc Semester IV: 2025-2026

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Exercise 1. Assume that a statement S has a synthesized attribute $S.code$, and an inherited attribute $S.next$, A Boolean expression B also has a synthesized attribute $B.code$, and two inherited attributes $B.true$ and $B.false$.

Answer the following questions.

- (a) Generate intermediate code for `if (a < 10) b = 2*a; else b = a/2;` where $S.next = L_1$.
- (b) Generate intermediate code for `if (a - 5 > b + 2) a = a-1; else a = a+1;` where $S.next = L_1$.
- (c) Generate intermediate code for `if (x < 100 || x > 200 && x != y) x = x + 1;` where $S.next = L_1$.

Exercise 2. Assume that a statement S has a synthesized attribute $S.code$, and an inherited attribute $S.next$, A Boolean expression B also has a synthesized attribute $B.code$, and two inherited attributes $B.true$ and $B.false$.

Answer the following questions.

- (a) Give SDD for $S \rightarrow \text{while } (B) S_1$, where $S.next = L$.
- (b) Give SDD for $S \rightarrow \text{repeat } S_1 \text{ while } B$, where $S.next = L$.
- (c) Give SDD for $S \rightarrow \text{for } (S_1; B; S_2) S_3$, where $S.next = L$.

Exercise 3. Following are two different translations of

`for(a=1,i=1; i<=5; ++i) a *=2;`

Count the number of unconditional jump and conditional branches. Which translation do you prefer?

# Code-I	# Code II
a=1	a=1
i=1	i=1
L1:	goto L1
if i>5 goto L2	L2:
a = a*2	a = a*2
i=i+1	i=i+1
goto L1	L1:
L2:	if i<=5 goto L2
	L3:

Exercise 4. How do you modify the SDD of $S \rightarrow \text{while } (B) S_1$ to reduce the number of branches?

Exercise 5. Compare the following three C codes and the corresponding assembly codes.

```

# xor ----
movl -20(%rbp), %eax
cmpl $9, %eax
setle %dl
movl -16(%rbp), %eax
cmpl $20, %eax
setg %al
xorl %edx, %eax
testb %al, %al
je .L2
movl $1, -12(%rbp)
jmp .L3
.L2:
movl $0, -12(%rbp)
.L3:
# or ----
movl -20(%rbp), %eax
cmpl $9, %eax
jle .L2
movl -16(%rbp), %eax
cmpl $20, %eax
jle .L3
.L2:
movl $1, -12(%rbp)
jmp .L4
.L3:
movl $0, -12(%rbp)
.L4:
# and ----
movl -20(%rbp), %eax
cmpl $9, %eax
jg .L2
movl -16(%rbp), %eax
cmpl $20, %eax
jle .L2
movl $1, -12(%rbp)
jmp .L3
.L2:
movl $0, -12(%rbp)
.L3:

if((a < 10) ^ (b > 20)) c = 1;
else c = 0;

if((a < 10) || (b > 20)) c = 1;
else c = 0;

if((a < 10) && (b > 20)) c = 1;
else c = 0;

```