Week 11

Xiaoyuan Xie 谢晓园
xxie@whu.edu.cn
计算机学院E301

Week 11 作业

- **教材P263 6.6.1**

  在右图6-36的语法制导定义中，

  添加处理下列控制流构造的规则：

  - 1) 一个 repeat 语句：repeat S while B
  - 2) 一个 for 循环语句：for (S1; B; S2) S3

PRODUCTION	SEMANTIC RULES
$P \rightarrow S$	$S.next = newlabel()$ $P.code = S.code \mid\mid label(S.next)$
$S \rightarrow$ **assign**	$S.code =$ **assign**$.code$
$S \rightarrow$ **if** (B) S_1	$B.true = newlabel()$ $B.false = S_1.next = S.next$ $S.code = B.code \mid\mid label(B.true) \mid\mid S_1.code$
$S \rightarrow$ **if** (B) S_1 **else** S_2	$B.true = newlabel()$ $B.false = newlabel()$ $S_1.next = S_2.next = S.next$ $S.code = B.code$ $\mid\mid label(B.true) \mid\mid S_1.code$ $\mid\mid gen('\texttt{goto}'\ S.next)$ $\mid\mid label(B.false) \mid\mid S_2.code$
$S \rightarrow$ **while** (B) S_1	$begin = newlabel()$ $B.true = newlabel()$ $B.false = S.next$ $S_1.next = begin$ $S.code = label(begin) \mid\mid B.code$ $\mid\mid label(B.true) \mid\mid S_1.code$ $\mid\mid gen('\texttt{goto}'\ begin)$
$S \rightarrow S_1\ S_2$	$S_1.next = newlabel()$ $S_2.next = S.next$ $S.code = S_1.code \mid\mid label(S_1.next) \mid\mid S_2.code$

Figure 6.36: Syntax-directed definition for flow-of-control statements.

Week 11 作业

- **教材P263 6.6.1** 在图6-36的语法制导定义中添加处理下列控制流构造的规则：

	PRODUCTION	SYNTAX RULE
1) repeat语句	S -> repeat S1 while B	S1.next = newlabel() B.true = newlabel() B.false = S.next S.code = label(B.true) || S1.code || label(S1.next) || B.code
2) for循环语句	S -> for (S1; B; S2) S3	S1.next = newlabel() B.true = newlabel() B.false = S.next S2.next = S1.next S3.next = newlabel() S.code = S1.code || lable(S1.next) || B.code || lable(B.true) || S3.code || label(S3.next) || S2.code || gen('goto', S1.next)

Week 11 作业

- **教材P263 6.6.3**

  假设C中存在一个异或运算。

  按照右图6-37的风格，

  写出这个运算符的代码生成规则。

  - 注：

    异或表达式 B1 ^ B2 为真，

    当且仅当两个分量恰有一个为真。

PRODUCTION	SEMANTIC RULES
$B \rightarrow B_1 \mid\mid B_2$	$B_1.true = B.true$ $B_1.false = newlabel()$ $B_2.true = B.true$ $B_2.false = B.false$ $B.code = B_1.code \mid\mid label(B_1.false) \mid\mid B_2.code$
$B \rightarrow B_1 \;\&\&\; B_2$	$B_1.true = newlabel()$ $B_1.false = B.false$ $B_2.true = B.true$ $B_2.false = B.false$ $B.code = B_1.code \mid\mid label(B_1.true) \mid\mid B_2.code$
$B \rightarrow ! B_1$	$B_1.true = B.false$ $B_1.false = B.true$ $B.code = B_1.code$
$B \rightarrow E_1$ **rel** E_2	$B.code = E_1.code \mid\mid E_2.code$ $\mid\mid gen('\texttt{if}'\ E_1.addr\ \textbf{rel}.op\ E_2.addr\ '\texttt{goto}'\ B.true)$ $\mid\mid gen('\texttt{goto}'\ B.false)$
$B \rightarrow$ **true**	$B.code = gen('\texttt{goto}'\ B.true)$
$B \rightarrow$ **false**	$B.code = gen('\texttt{goto}'\ B.false)$

Figure 6.37: Generating three-address code for booleans

Week 11 作业

- **教材P263 6.6.3** 假设 C 中存在一个异或运算。按照图 6-37 的风格写出这个运算符的代码生成规则。
  - 解答:

    B1 ^ B2 等价为 (!B1 && B2) || (B1 && !B2)

PRODUCTION	SYNTAX RULE
B -> B1 ^ B2	B1.true = newlabel() B1.false = newlabel() B2.true = B.true B2.false = B1.true b3 = newboolean() b3.code = B1.code b3.true = newlabel() b3.false = B.false b4 = newboolean() b4.code = B2.code b4.true = B.false b4.false = B.true S.code = B1.code || label(B1.false) || B2.code || label(B1.true) || b3.code || label(b3.true) || b4.code

Thank you!