

BNF for Core

- $\langle \text{prog} \rangle ::= \text{program } \langle \text{decl seq} \rangle$ (1)
 $\quad \quad \quad \text{begin } \langle \text{stmt seq} \rangle \text{ end}$
 $\langle \text{decl seq} \rangle ::= \langle \text{decl} \rangle \mid \langle \text{decl} \rangle \langle \text{decl seq} \rangle$ (2)
 $\langle \text{stmt seq} \rangle ::= \langle \text{stmt} \rangle \mid \langle \text{stmt} \rangle \langle \text{stmt seq} \rangle$ (3)
 $\langle \text{decl} \rangle ::= \text{int } \langle \text{id list} \rangle;$ (4)
 $\langle \text{id list} \rangle ::= \langle \text{id} \rangle \mid \langle \text{id} \rangle, \langle \text{id list} \rangle$ (5)
 $\langle \text{stmt} \rangle ::= \langle \text{assign} \rangle \mid \langle \text{if} \rangle \mid \langle \text{loop} \rangle \mid \langle \text{in} \rangle \mid \langle \text{out} \rangle$ (6)
 $\langle \text{assign} \rangle ::= \langle \text{id} \rangle = \langle \text{exp} \rangle;$ (7)
 $\langle \text{if} \rangle ::= \text{if } \langle \text{cond} \rangle \text{ then } \langle \text{stmt seq} \rangle \text{ end};$ (8)
 $\quad \quad \quad \text{if } \langle \text{cond} \rangle \text{ then } \langle \text{stmt seq} \rangle \text{ else } \langle \text{stmt seq} \rangle \text{ end};$
 $\langle \text{loop} \rangle ::= \text{while } \langle \text{cond} \rangle \text{ loop } \langle \text{stmt seq} \rangle \text{ end};$ (9)
 $\langle \text{in} \rangle ::= \text{read } \langle \text{id list} \rangle;$ (10')
 $\langle \text{out} \rangle ::= \text{write } \langle \text{id list} \rangle;$ (11')

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BNF for Core (contd.)

- $\langle \text{cond} \rangle ::= \langle \text{comp} \rangle \mid ! \langle \text{cond} \rangle$ (12)
 $\quad \quad \quad \mid [\langle \text{cond} \rangle \ \&\& \ \langle \text{cond} \rangle] \mid [\langle \text{cond} \rangle \ \text{or} \ \langle \text{cond} \rangle]$
 $\langle \text{comp} \rangle ::= (\langle \text{op} \rangle \ \langle \text{comp op} \rangle \ \langle \text{op} \rangle)$ (13)
 $\langle \text{exp} \rangle ::= \langle \text{fac} \rangle \mid \langle \text{fac} \rangle + \langle \text{exp} \rangle \mid \langle \text{fac} \rangle - \langle \text{exp} \rangle$ (14)
 $\langle \text{fac} \rangle ::= \langle \text{op} \rangle \mid \langle \text{op} \rangle * \langle \text{fac} \rangle$ (15)
 $\langle \text{op} \rangle ::= \langle \text{no} \rangle \mid \langle \text{id} \rangle \mid (\langle \text{exp} \rangle)$ (16)
 $\langle \text{comp op} \rangle ::= != \mid == \mid < \mid > \mid <= \mid >=$ (17)
 $\langle \text{id} \rangle ::= \langle \text{let} \rangle \mid \langle \text{let} \rangle \langle \text{id} \rangle \mid \langle \text{let} \rangle \langle \text{no} \rangle$ (18')
 $\langle \text{let} \rangle ::= A \mid B \mid C \mid \dots \mid X \mid Y \mid Z$ (19)
 $\langle \text{no} \rangle ::= \langle \text{digit} \rangle \mid \langle \text{digit} \rangle \langle \text{no} \rangle$ (20)
 $\langle \text{digit} \rangle ::= 0 \mid 1 \mid 2 \mid 3 \mid \dots \mid 9$ (21)

■ Note:

Productions (18')-(21) have no *semantic* significance;
 (19) and (21) are superseded by (19') and (21') on next page:

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BNF for Core (contd.)

$\langle \text{let} \rangle ::= A \mid B \mid C \mid D \mid E \mid F \mid G \mid H \mid I \mid J \mid K \mid L \mid M$
 $\mid N \mid O \mid P \mid Q \mid R \mid S \mid T \mid U \mid V \mid W \mid X \mid Y \mid Z \quad (19')$

$\langle \text{digit} \rangle ::= 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7 \mid 8 \mid 9 \quad (21')$