Computer Aided Language Engineering (CALE) Part II – Native Patterns

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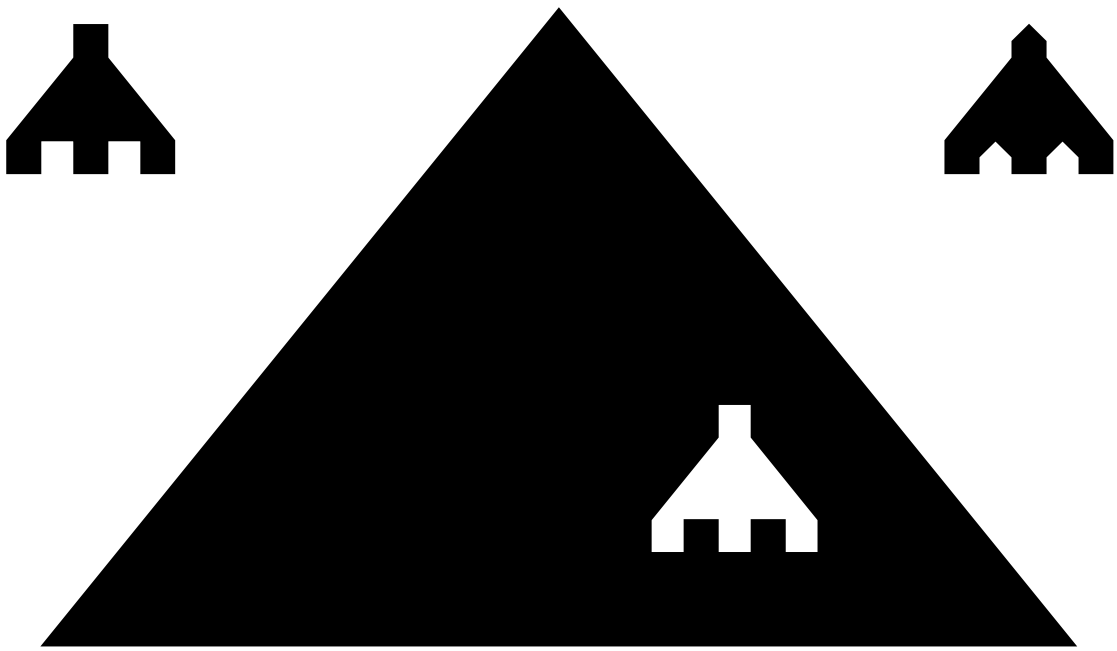
Chris Verhoef

overview

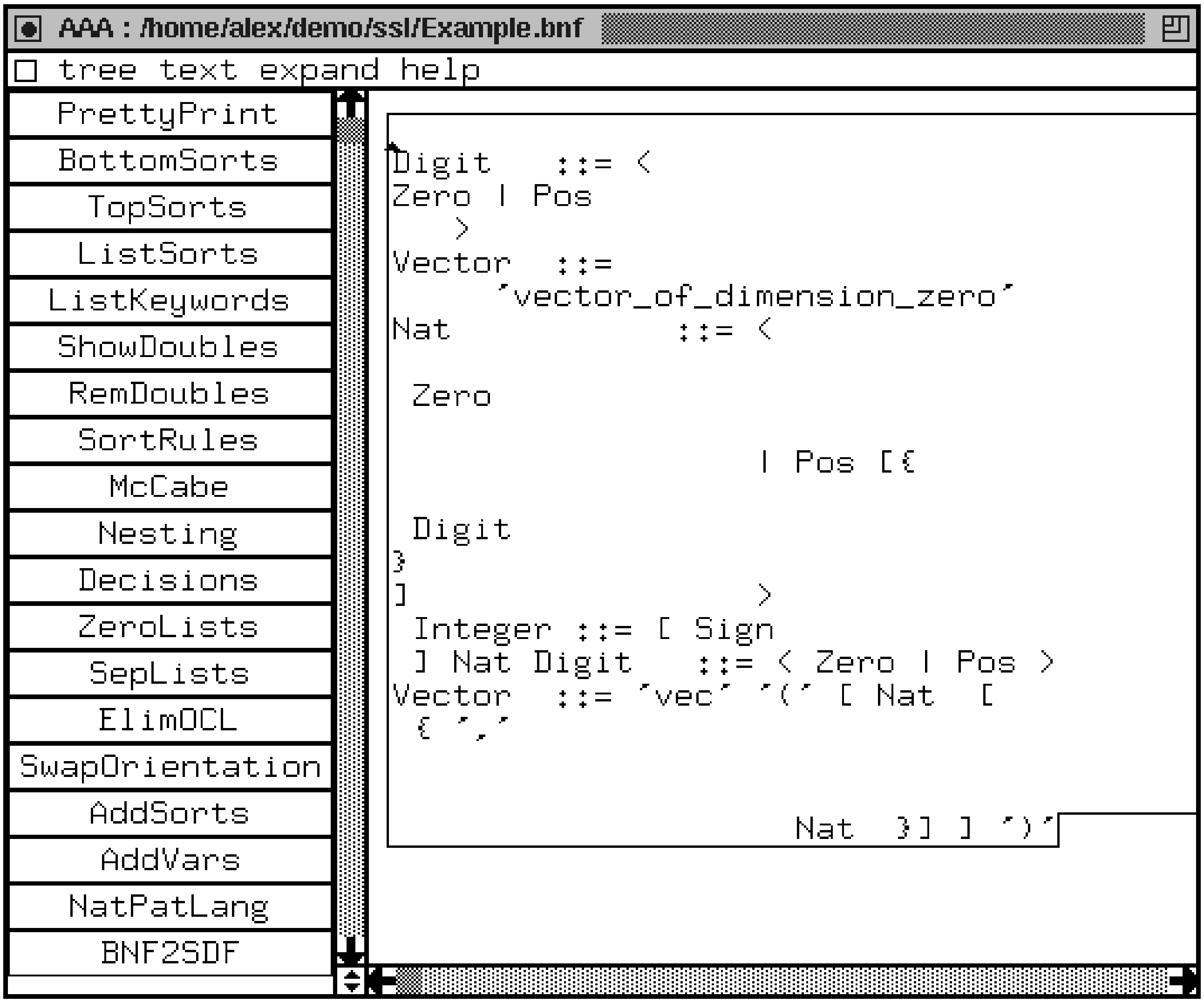
- motivation
- CALE tools: generation of a native pattern language



motivation

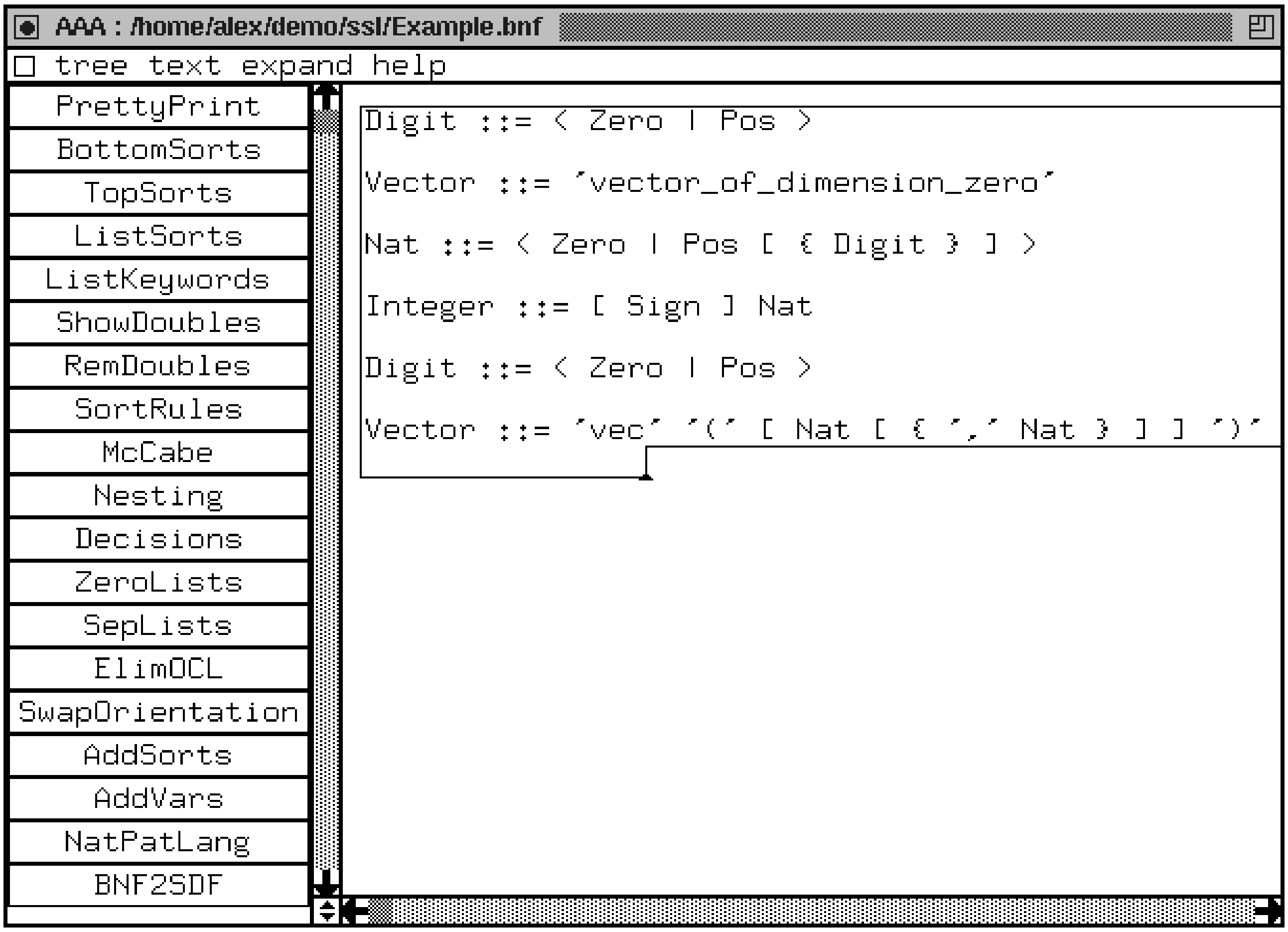
- careful and correct design
- no new language
- high productivity
- generic

Example BNF

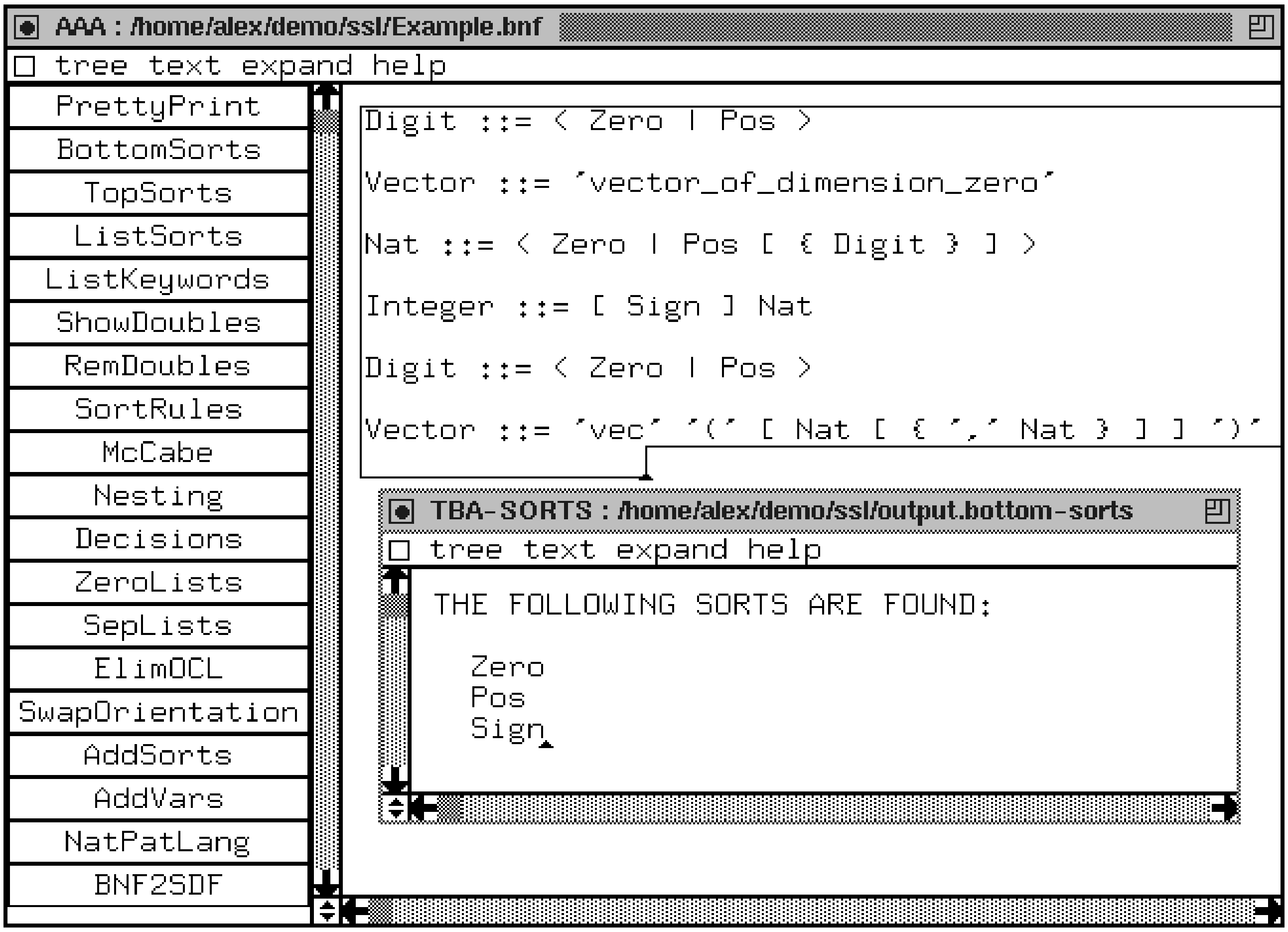


AAA : /home/alex/demo/ssl/Example.bnf
tree text expand help
PrettyPrint
BottomSorts
TopSorts
ListSorts
ListKeywords
ShowDoubles
RemDoubles
SortRules
McCabe
Nesting
Decisions
ZeroLists
SepLists
ElimOCL
SwapOrientation
AddSorts
AddVars
NatPatLang
BNF2SDF
Digit ::= <
Zero | Pos
>
Vector ::=
'vector_of_dimension_zero'
Nat ::= <
Zero
| Pos [{
Digit
}
] >
Integer ::= [Sign
] Nat Digit ::= < Zero | Pos >
Vector ::= 'vec' '(' [Nat [
{ ','
Nat }]] ')'

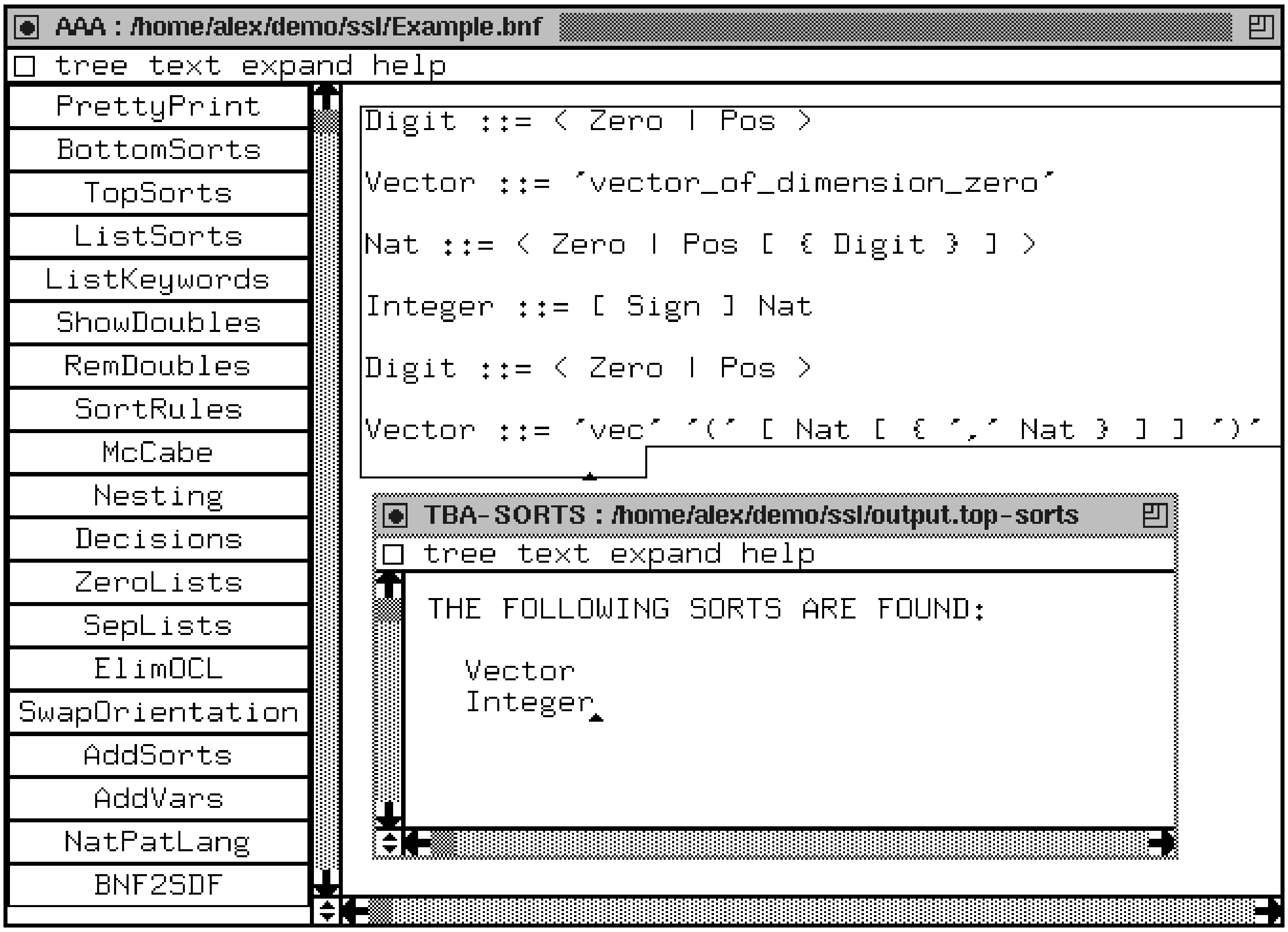
pretty printed BNF



bottom sorts



top sorts



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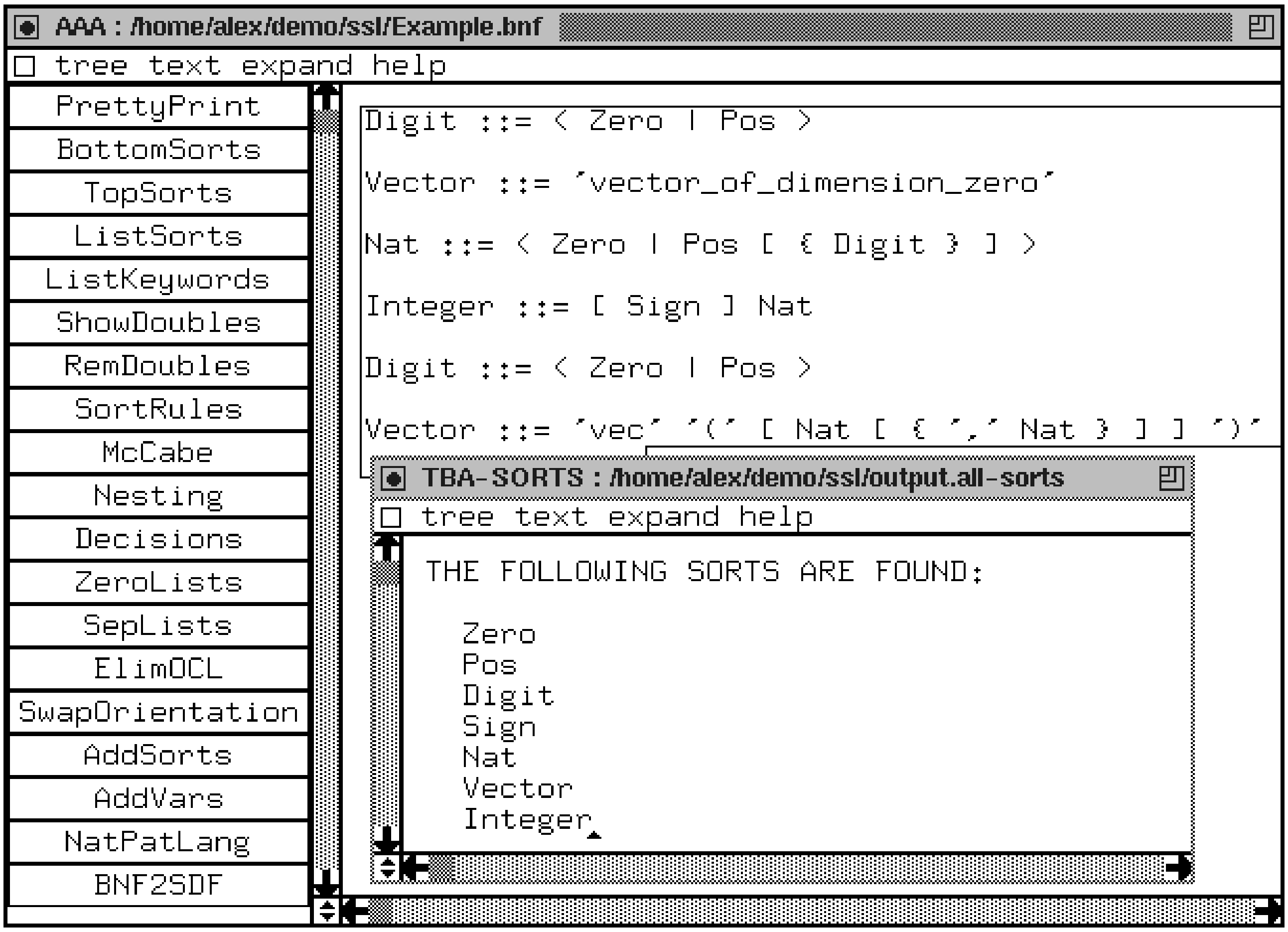
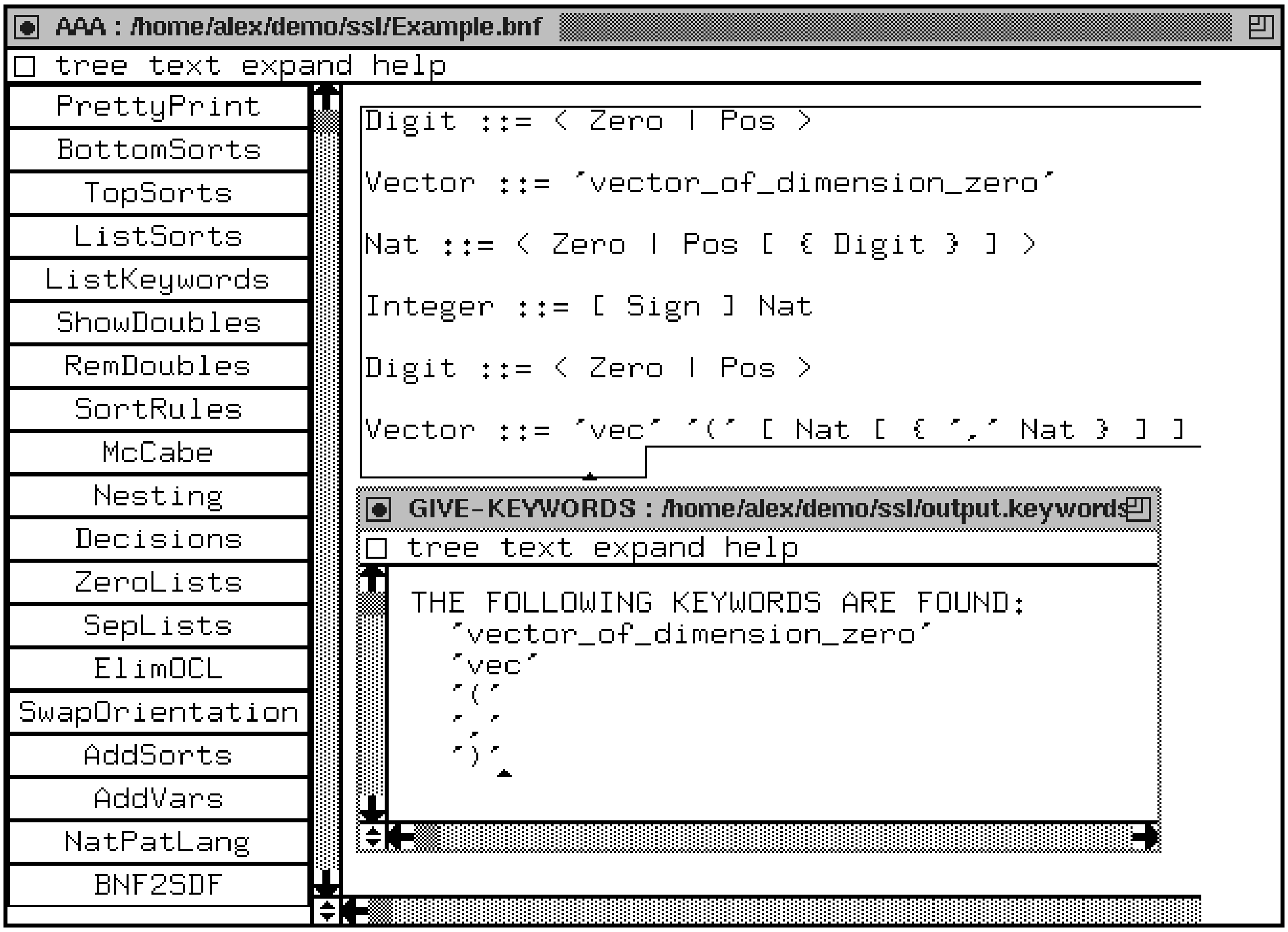
BNF2SDF
Digit ::= < Zero | Pos >
Vector ::= 'vector_of_dimension_zero'
Nat ::= < Zero | Pos [{ Digit }] >
Integer ::= [Sign] Nat
Digit ::= < Zero | Pos >
Vector ::= 'vec' '(' [Nat [{ ',' Nat }]] ')'
TBA-SORTS : /home/alex/demo/ssl/output.top-sorts
tree text expand help
THE FOLLOWING SORTS ARE FOUND:
Vector
Integer

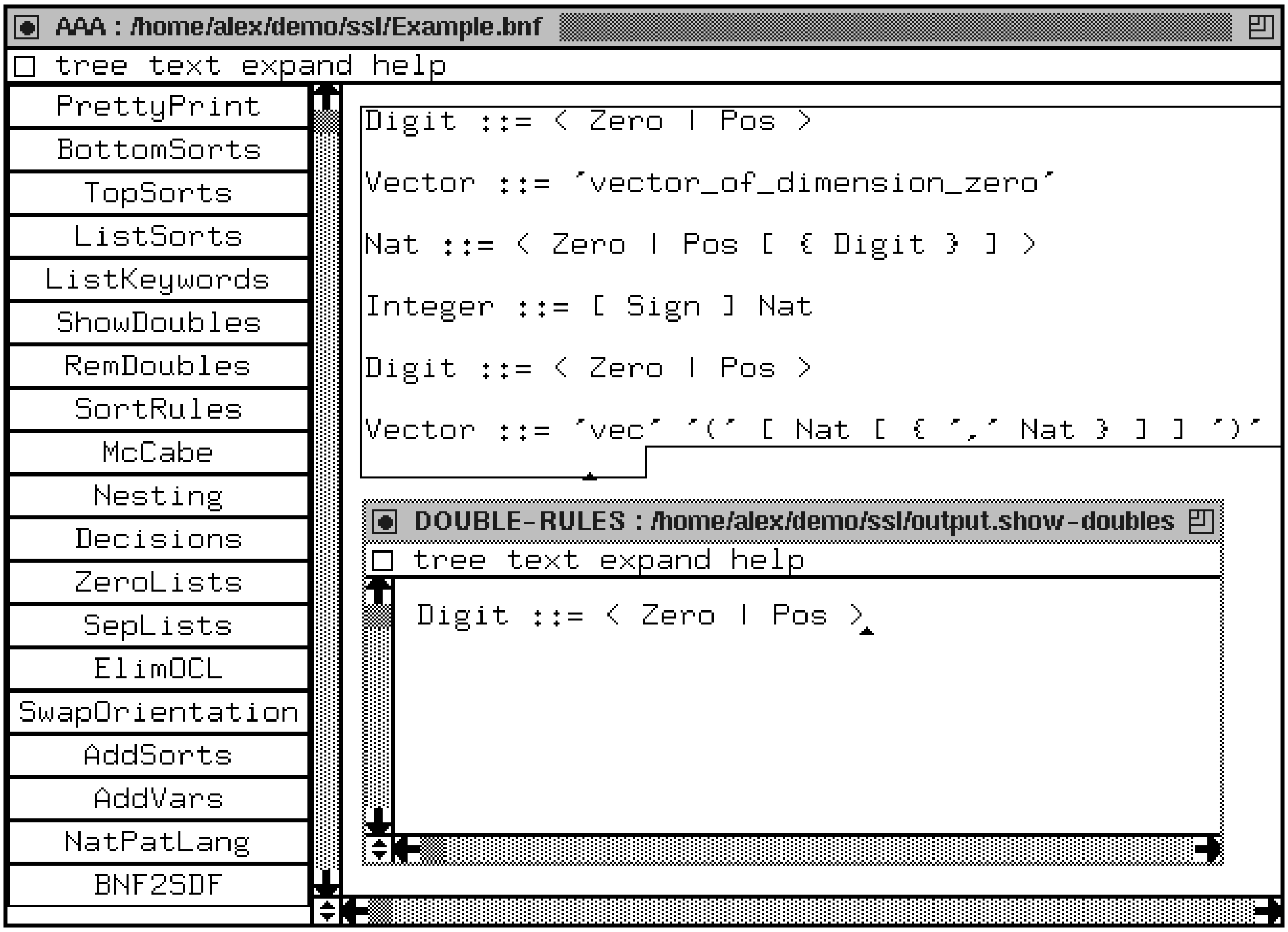
list all sorts



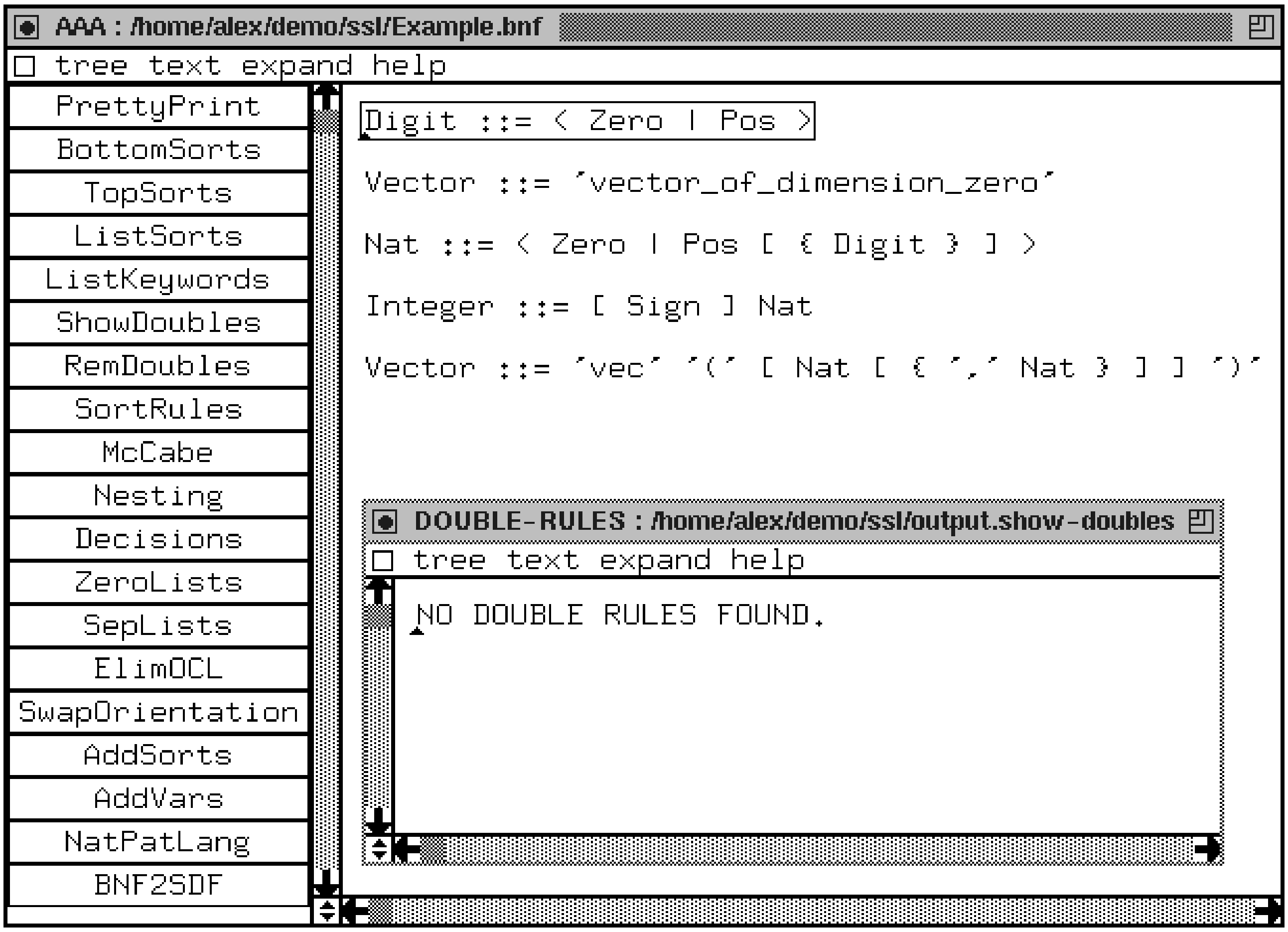
list all keywords



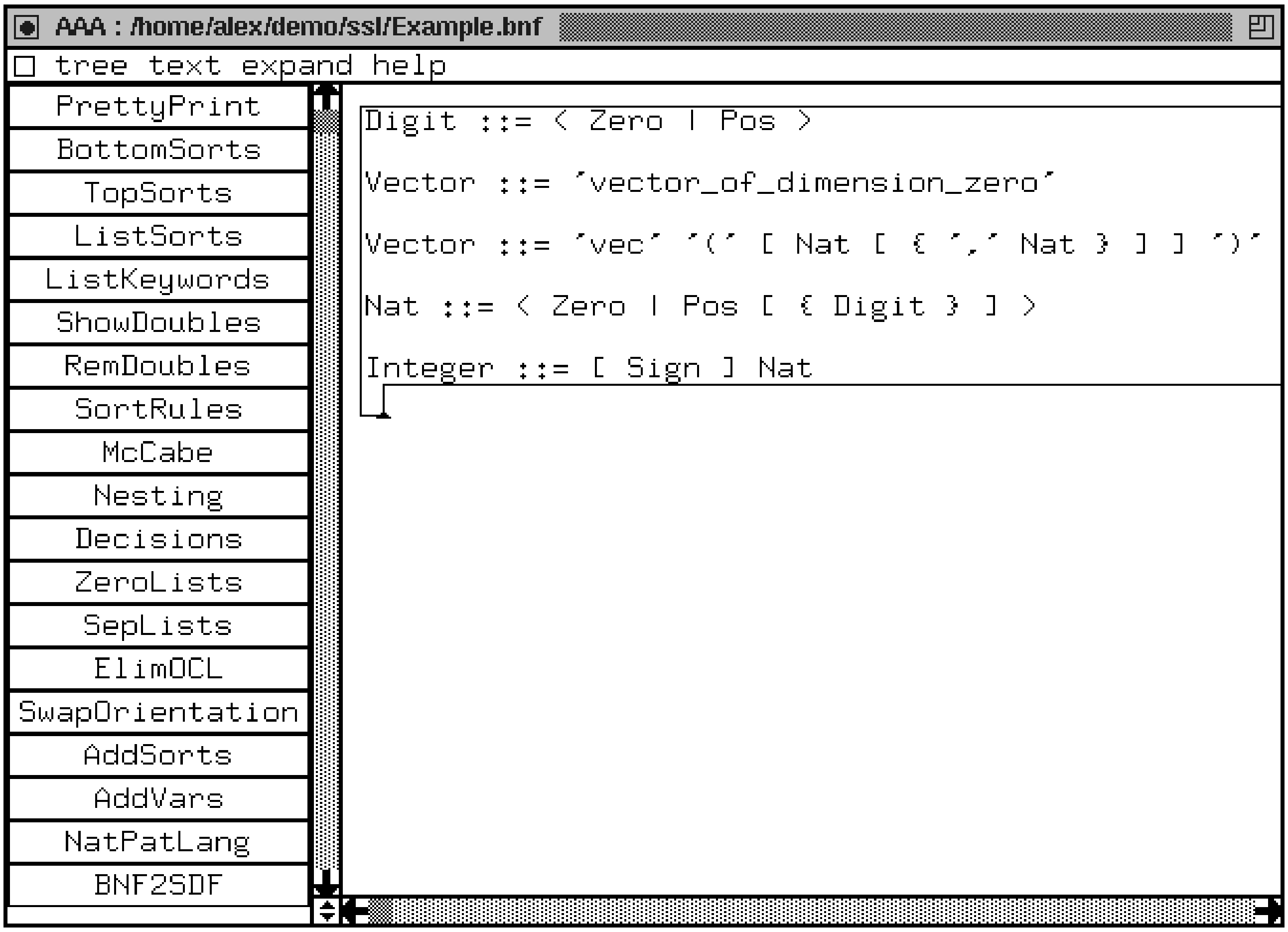
show double BNF rules



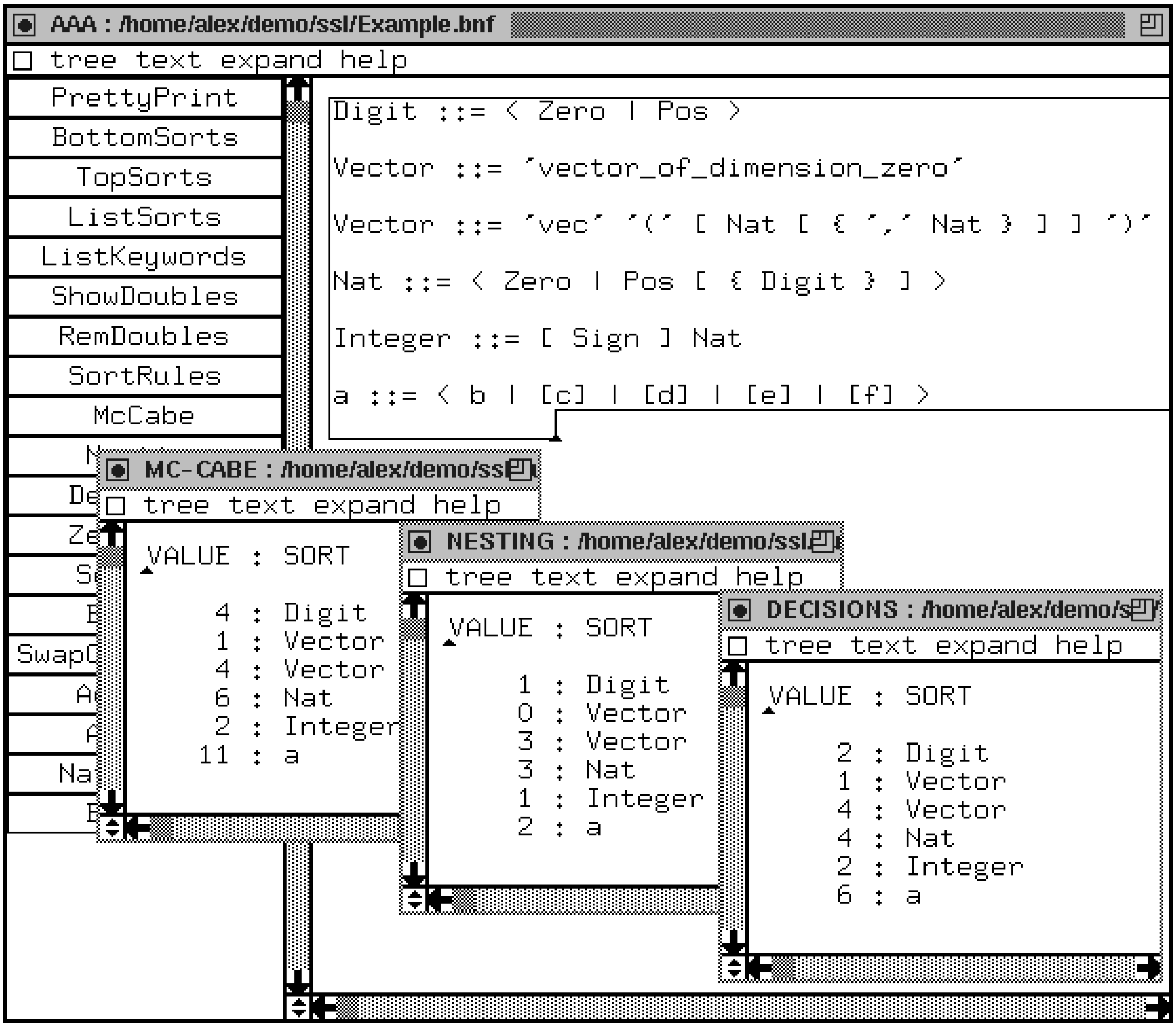
remove double BNF rules



sort BNF rules



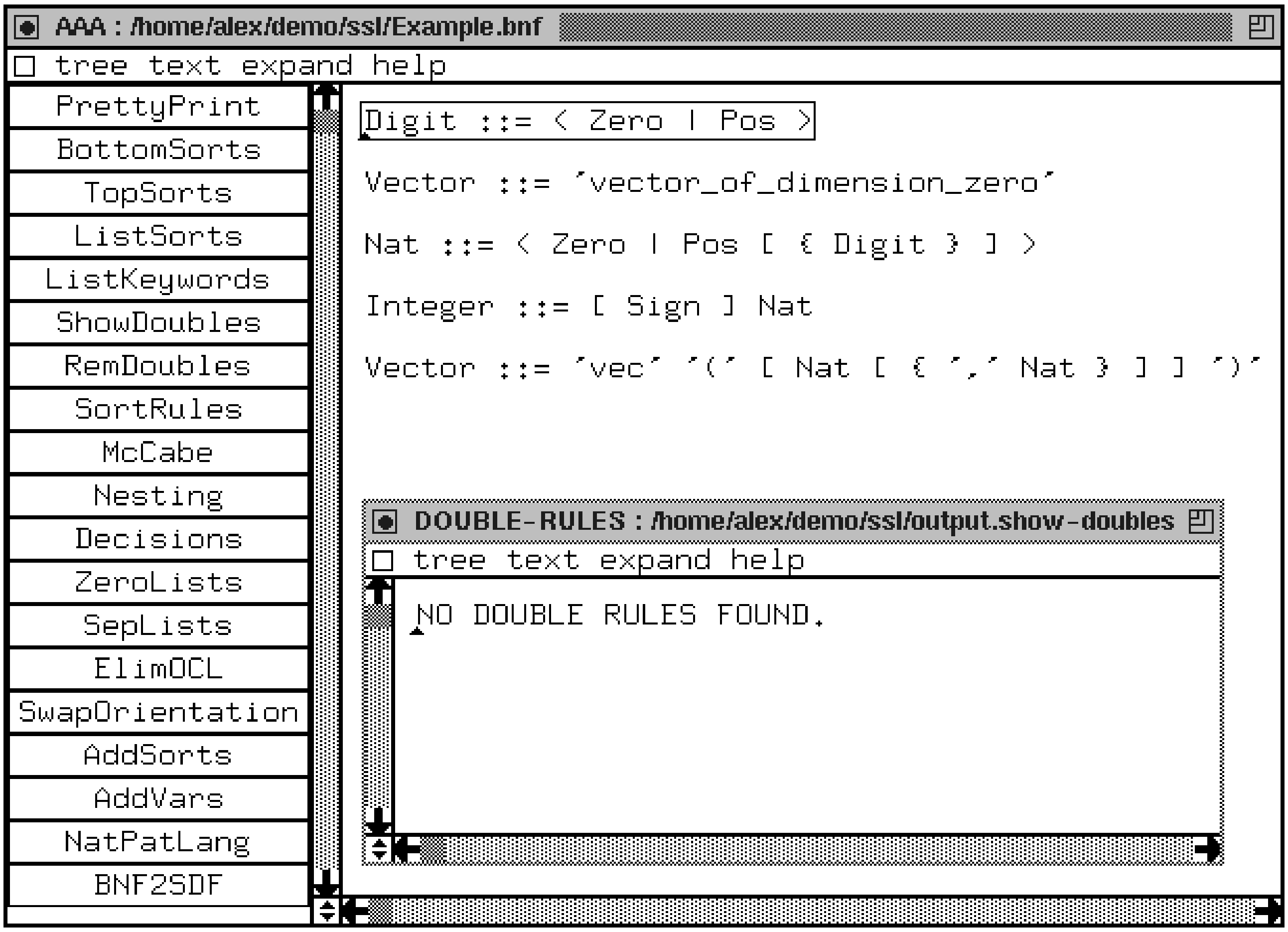
metrics on BNF



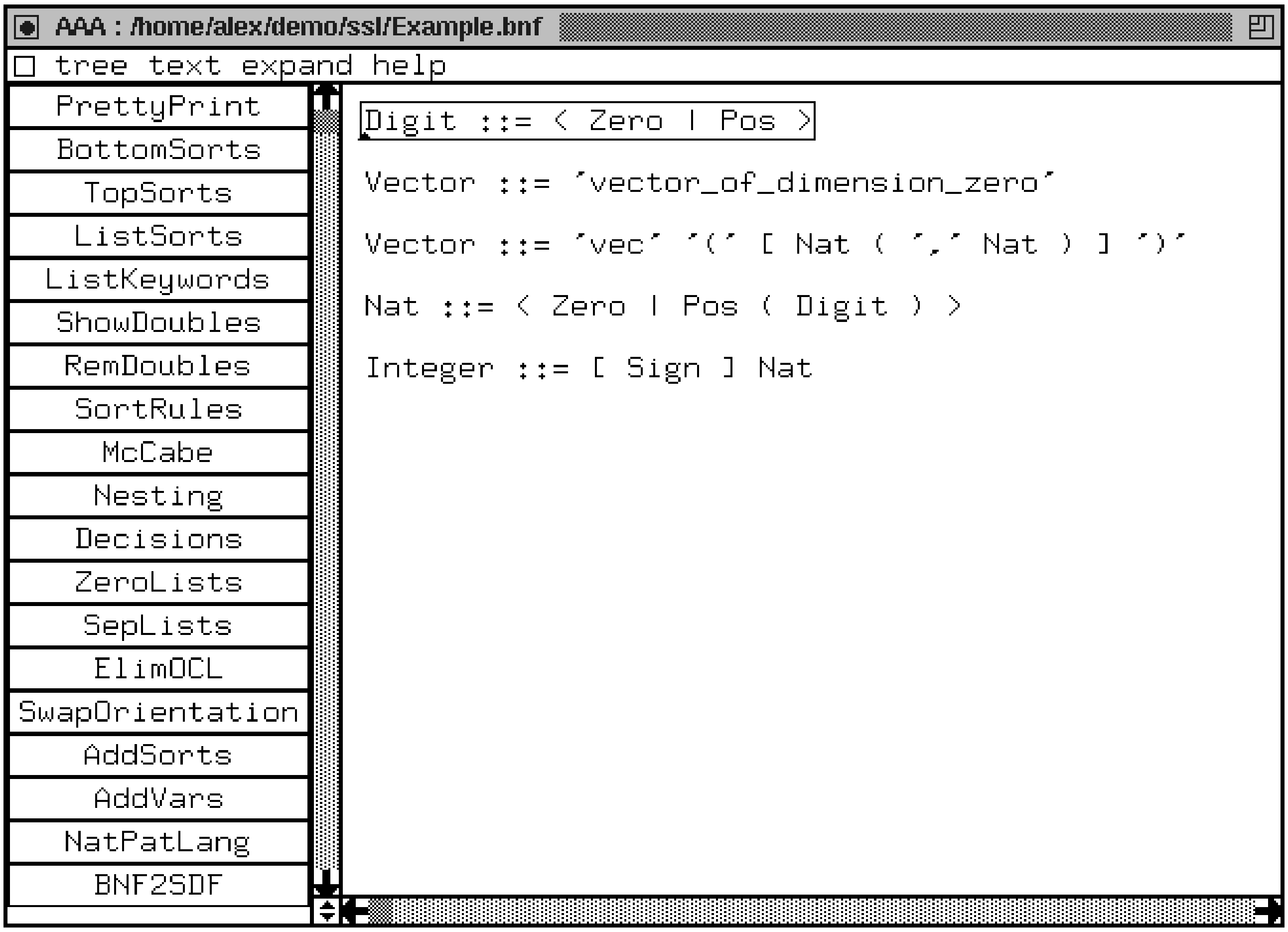
assembly line for generating native pattern languages

- introduce zero lists
- introduce separated lists
- eliminate optionals, choices and complex list items
- turn BNF into context-free functions
- declare sorts
- declare pattern variables

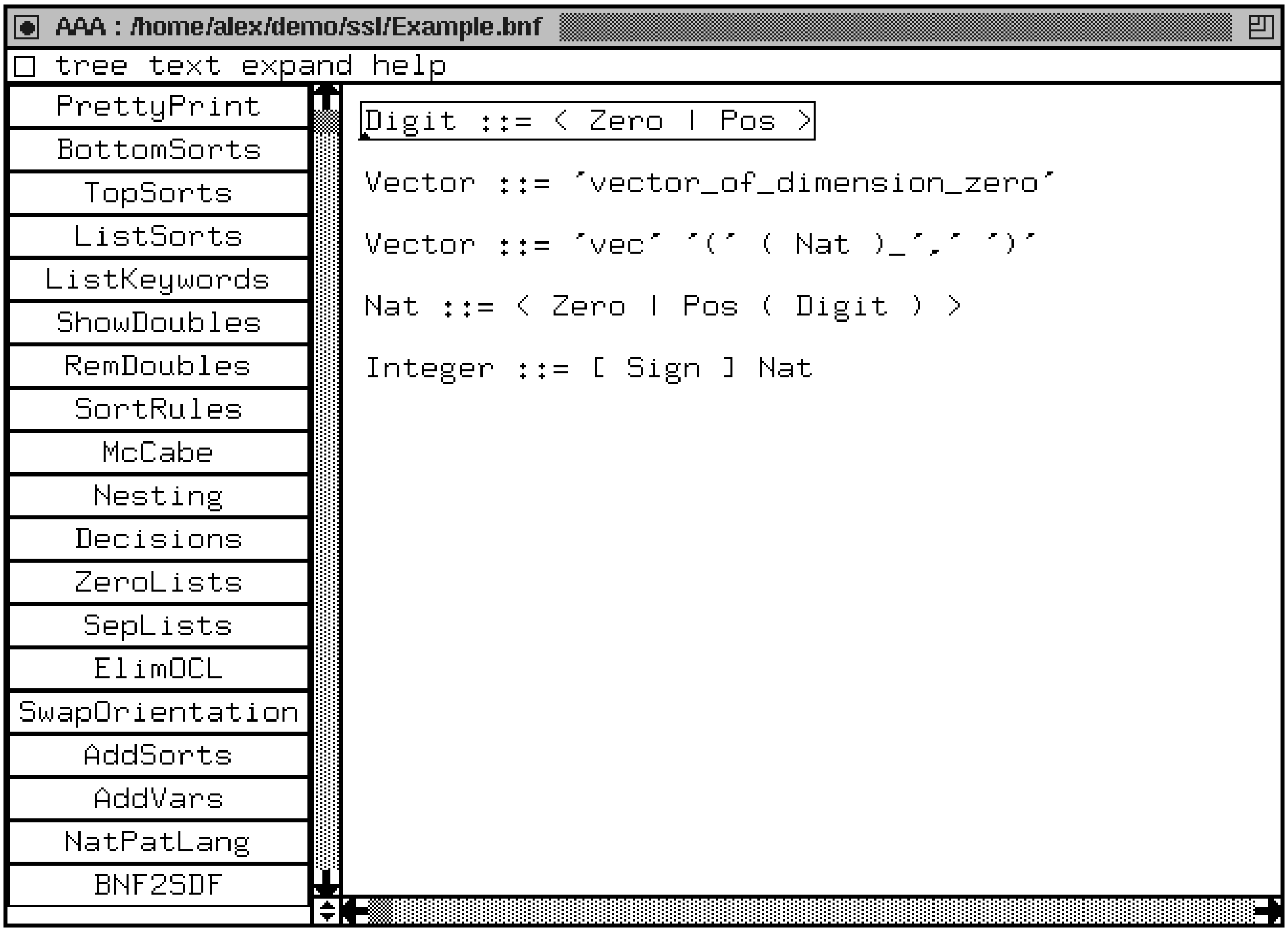
example without doubles



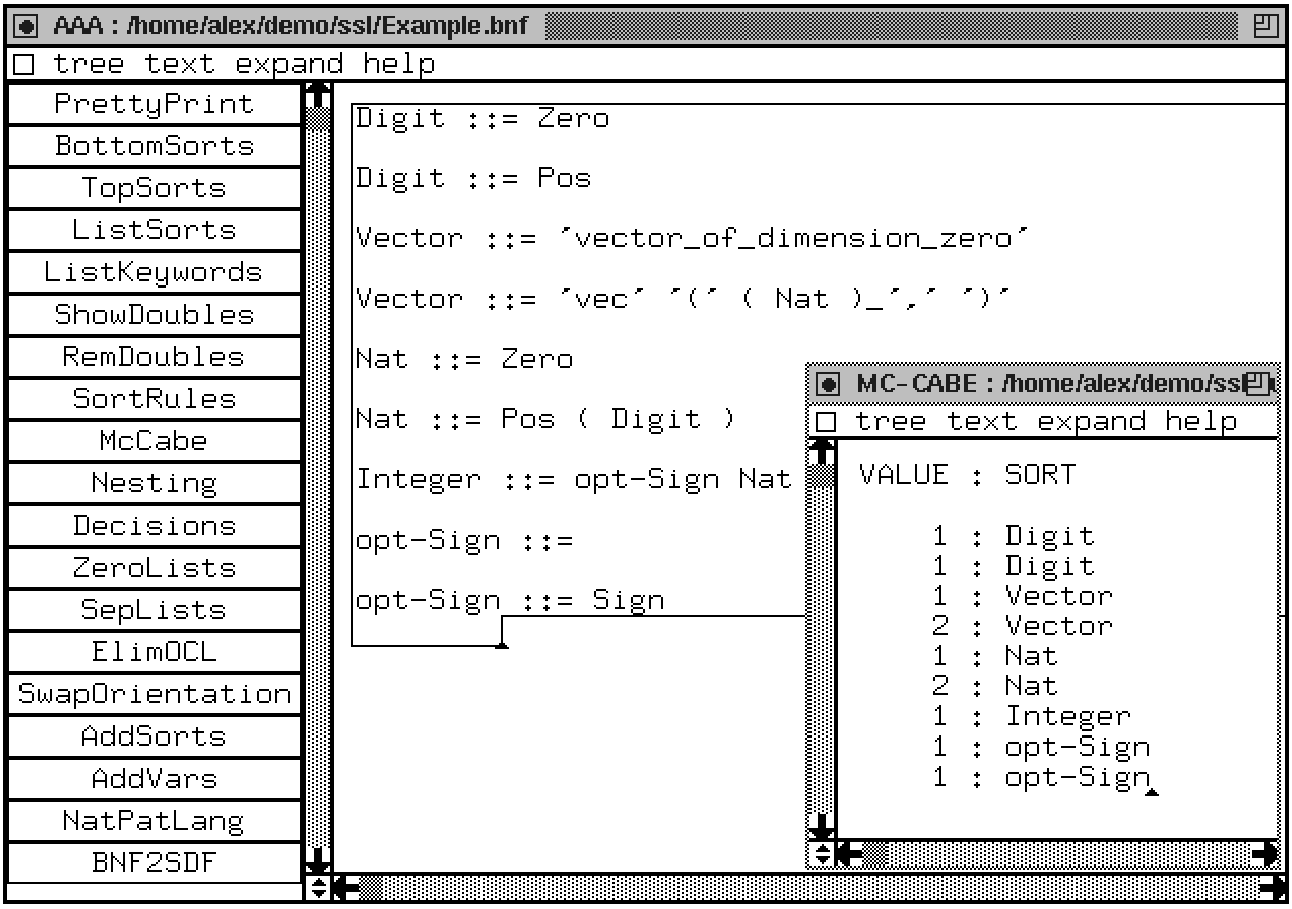
zero lists introduced



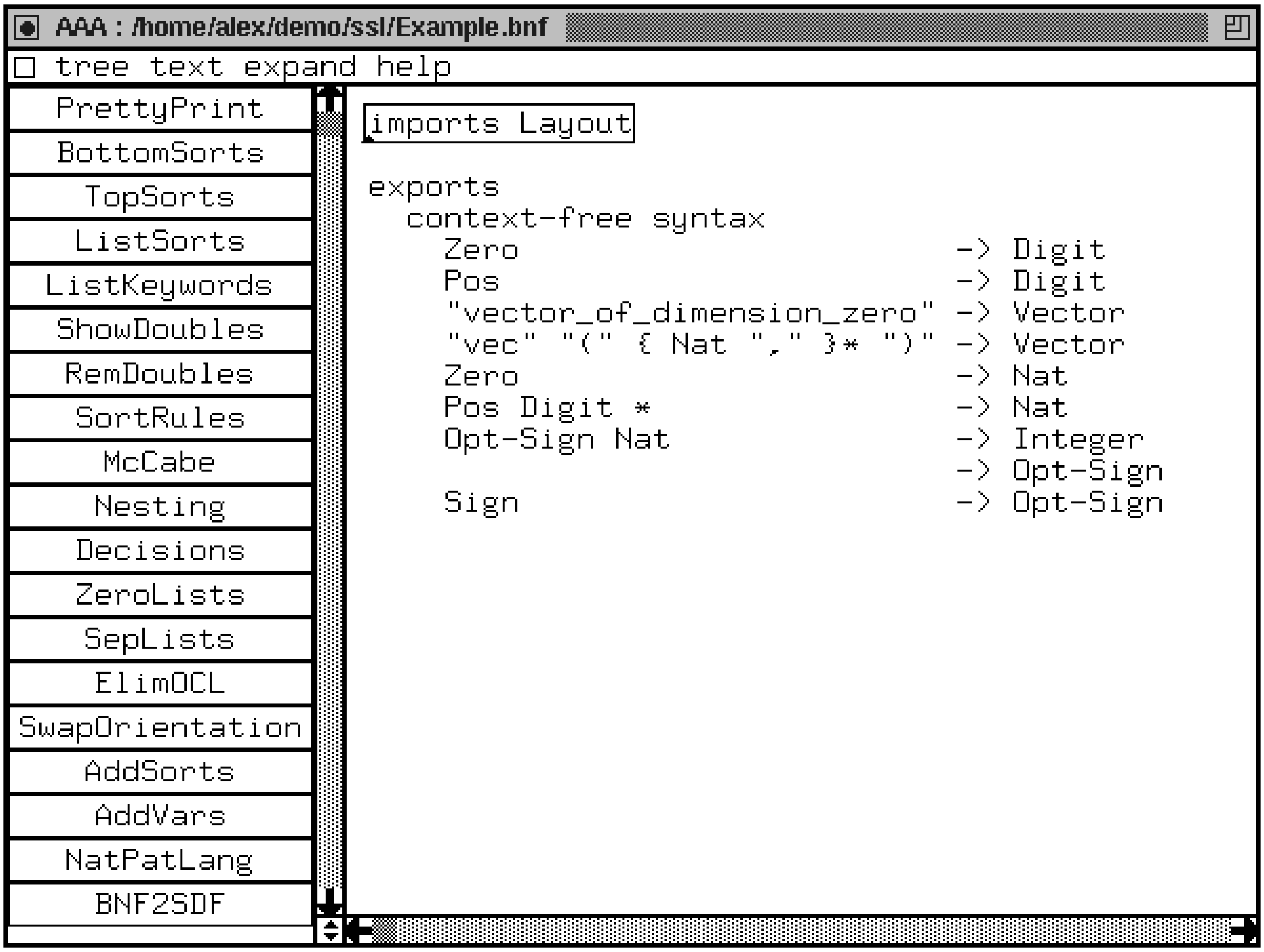
separated lists introduced



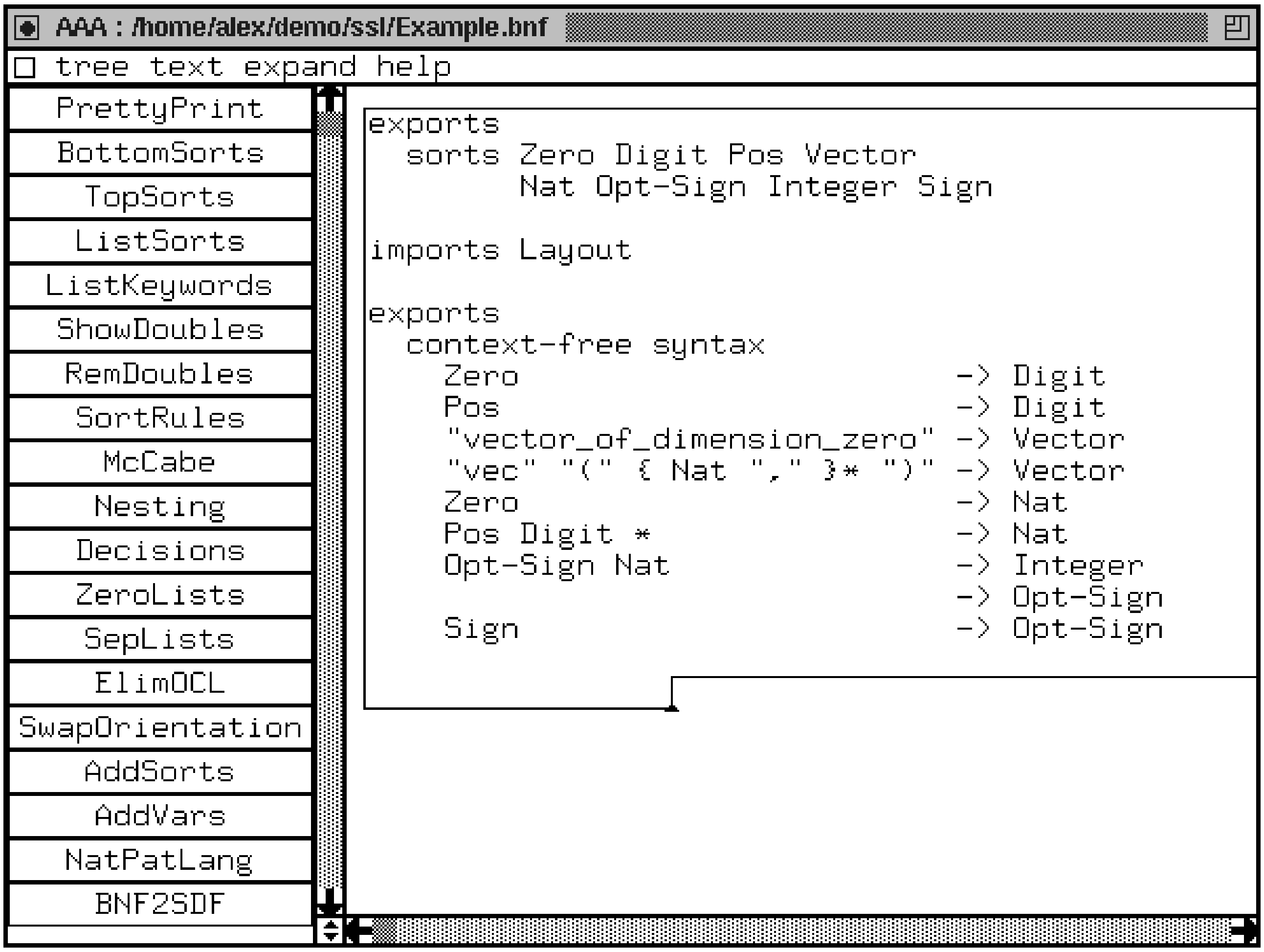
simplification of rules



BNF to context-free functions



make SDF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AddSorts
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NatPatLang
BNF2SDF
exports
sorts Zero Digit Pos Vector
Nat Opt-Sign Integer Sign
imports Layout
exports
context-free syntax
Zero -> Digit
Pos -> Digit
"vector_of_dimension_zero" -> Vector
"vec" "(" { Nat "," }* ")" -> Vector
Zero -> Nat
Pos Digit * -> Nat
Opt-Sign Nat -> Integer
-> Opt-Sign
Sign -> Opt-Sign

native pattern language

ADD-VARS : /home/alex/demo/ssl/MuSSL.syn

tree text expand help

```
exports
  sorts Zero Digit Pos Vector
        Nat Opt-Sign Integer Sign

imports Layout

exports
  context-free syntax
    Zero                               -> Digit
    Pos                                -> Digit
    "vector_of_dimension_zero"         -> Vector
    "vec" "(" { Nat "," }* ")"         -> Vector
    Zero                               -> Nat
    Pos Digit *                        -> Nat
    Opt-Sign Nat                       -> Integer
                                       -> Opt-Sign
    Sign                               -> Opt-Sign

exports
  variables
    Zero      [0-9] +     -> Zero
    Zero      [0-9] + "+" -> Zero +
    Zero      [0-9] + "*" -> Zero *
    Digit     [0-9] +     -> Digit
    Digit     [0-9] + "+" -> Digit +
    Digit     [0-9] + "*" -> Digit *
    Pos       [0-9] +     -> Pos
    Pos       [0-9] + "+" -> Pos +
    Pos       [0-9] + "*" -> Pos *
    Vector    [0-9] +     -> Vector
    Vector    [0-9] + "+" -> Vector +
    Vector    [0-9] + "*" -> Vector *
    Nat       [0-9] +     -> Nat
    Nat       [0-9] + "+" -> Nat +
    Nat       [0-9] + "*" -> Nat *
    Opt-Sign [0-9] +     -> Opt-Sign
    Opt-Sign [0-9] + "+" -> Opt-Sign
                              +
    Opt-Sign [0-9] + "*" -> Opt-Sign
                              *
    Integer   [0-9] +     -> Integer
```

the end