

Context Free Grammar Development Program.

COMP 6751 Project 2 Challenge File

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0. Expectations of originality

I certify that this submission is my original work and meets the Faculty's Expectations of Originality.

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1. Challenge File

1.1. Challenge File 1

Given: John ate at his desk.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 1 ~ 5** shown below.

The screenshot shows the PyCharm IDE interface with the code editor containing the `PreProcess()` function. The function reads a sentence from standard input and performs several processing steps: sentence splitting, POS tagging, name entity recognition, and Earley parsing. The results are printed to the console, showing the tokens, their parts of speech, and the Earley parse process. The Earley parse process output shows the step-by-step derivation of the sentence, with arrows indicating the addition of tokens and the creation of non-terminal symbols like `NP`, `VP`, and `CC`.

```
Run: PreProcess () >
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
John ate at his desk

Options to the results: save/print
Do you want to save the parse tree? N
Do you want to print the parse tree? Y

[Sentences Splitting]
['John ate at his desk']

[POS Tagging]
[['John', 'NNP'], ('ate', 'NN'), ('at', 'IN'), ('his', 'PRP$')]

[Name Entities]
{'John'}

[Earley Parsing]
([],
 (NP[NUM='sg']
  (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] John))))
  (VP[NUM=?n, TENSE='past']
   (V[P[NUM=?n, TENSE='past']] (IV[TENSE='past'] ate)
    (PP[ (IN[] (P[] at)) (NP[NUM=?n] (PRP[] his)))))))

[Earley Parse Process]
|.Jo.at.at.hi.de.|  
|[--] . . .| [0:1] 'John'  
| . [-] . . .| [1:2] 'ate'  
| . . [-] . .| [2:3] 'at'  
| . . . [-] .| [3:4] 'his'  
| . . . . [-]| [4:5] 'desk'  
| [--] . . . .| [0:1] PropN[NUM='sg'] -> 'John' *  
| [--] . . . .| [0:1] NNP[NUM='sg'] -> PropN[NUM='sg'] *  
| [--> . . . .| [0:1] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}  
| [--] . . . .| [0:1] Nom[NUM='sg'] -> NNP[NUM='sg'] *  
| [--> . . . .| [0:1] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n: 'sg'}  
| [--] . . . .| [0:1] NP[NUM='sg'] -> Nom[NUM='sg'] *
```

Figure 1. Challenge File 1 result: 'John ate at his desk'.

Run: PreProcess (1) ×

```

[Earley Parse Process]
|.Jo.at.at.hi.de.| 
[[-] . . . .| [0:1] 'John'
|. [-] . . .| [1:2] 'ate'
|. . [-] .| [2:3] 'at'
|. . . [-] .| [3:4] 'his'
|. . . . [-] .| [4:5] 'desk'
[--] . . . .| [0:1] Prop[NUM='sg'] -> 'John' *
[--] . . . .| [0:1] NNP[NUM=?n] -> Prop[NUM=?n] *
[--> . . . .| [0:1] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
[--> . . . .| [0:1] Nom[NUM='sg'] -> NNP[NUM='sg'] *
[--> . . . .| [0:1] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n: 'sg'}
[--] . . . .| [0:1] NP[NUM='sg'] -> Nom[NUM='sg'] *
[--] . . . .| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
[--> . . . .| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
[--> . . . .| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[--> . . . .| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n: 'sg'}
[--> . . . .| [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
|. [-] . . .| [1:2] TV[TENSE='past'] -> 'ate' *
|. [-] . . .| [1:2] IV[TENSE='past'] -> 'ate' *
|. [-> . . .| [1:2] VP[NUM=?n, TENSE=?t] -> IV[TENSE=?t] * TO[] VP[TENSE='inf'] {?t: 'past'}
|. [-> . . .| [1:2] VP[NUM=?n, TENSE=?t] -> IV[TENSE='past'] *
|. [-> . . .| [1:2] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
|. [-> . . .| [1:2] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
[----> . . .| [0:2] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
[----> . . .| [0:2] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
[----> . . .| [0:2] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
|. [-> . . .| [1:2] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'past'}
[----> . . .| [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] {?n: 'sg'}
[----> . . .| [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
|. . . [-] .| [2:3] P[] -> 'at' *
|. . . [-] .| [2:3] IN[] -> PP[] *
|. . . [-> . .| [2:3] PP[] -> IN[] * NP[] {}
|. . . [-> . .| [2:3] PP[] -> IN[] * DATE[] {}
|. . . [-] .| [3:4] PRP[] -> 'his' *
|. . . [-] .| [3:4] NP[NUM=?n] -> PRP[] *
|. . . . [-> . .| [3:4] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
|. . . . [-> . .| [3:4] NP[NUM=?n] -> PRP[] * DATE[] PP[] {}
```

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Figure 2. Challenge File 1 result: 'John ate at his desk'.

Run: PreProcess (1) ×

```

|. . . . [-] .| [3:4] PRP[] -> 'his' *
|. . . . [-] .| [3:4] NP[NUM=?n] -> PRP[] *
|. . . . [-> . .| [3:4] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
|. . . . [-> . .| [3:4] NP[NUM=?n] -> PRP[] * DATE[] PP[] {}
|. . . . [-> . .| [3:4] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
|. . . . [-> . .| [3:4] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
|. . . . [-> . .| [3:4] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
|. . . . [-> . .| [3:4] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
|. . . . [-> . .| [3:4] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
|. . . . [-> . .| [2:4] PP[] -> IN[] NP[] {}
|. . . [->> . .| [2:4] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
|. . . [->> . .| [2:4] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
|. . . [->> . .| [2:4] S[] -> PP[] * COMMA[] DATE[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
|. . . [->> . .| [2:4] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
|. . [-> . .| [1:4] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
|. . [-> . .| [1:4] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
|. . [-> . .| [1:4] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
[----> . .| [0:4] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
[----> . .| [0:4] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
[----> . .| [0:4] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
|. . . . [-] .| [4:5] NN[] -> 'desk' *
|. . . . [-] .| [4:5] N[NUM='sg'] -> NN[] *
|. . . . [-> . .| [4:5] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
|. . . . [-> . .| [4:5] Nom[NUM=?n] -> NI[] * Nom[NUM=?n] {}
|. . . . [-] .| [4:5] Nom[NUM=?n] -> NI[] *
|. . . . [-> . .| [4:5] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
|. . . . [-> . .| [4:5] NP[NUM=?n] -> Nom[NUM=?n] *
|. . . . [-> . .| [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
|. . . . [-> . .| [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
|. . . . [-> . .| [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
|. . . . [-> . .| [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
|. . . . [-> . .| [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
|. . . . [-> . .| [3:5] NP[NUM=?n] -> PRP[] NP[NUM=?n] *
|. . . . [-> . .| [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
|. . . . [-> . .| [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
|. . . . [-> . .| [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
|. . . . [-> . .| [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
|. . . . [-> . .| [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
```

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Figure 3. Challenge File 1 result: 'John ate at his desk'.

```

Run: PreProcess (1) ✘
1. [-----> .] [1:4] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1. [-----> .] [1:4] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
1. [-----> .] [0:4] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1. [-----> .] [0:4] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1. [-----> .] [0:4] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1. . . . . [--] [4:5] NN[] -> 'desk' *
1. . . . . [--] [4:5] NN[] -> NN[] *
1. . . . . [--] [4:5] NP[NUM='sg'] -> NN[] *
1. . . . . [--] [4:5] NP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1. . . . . [--] [4:5] Nom[NUM=?n] -> N[] *
1. . . . . [--] [4:5] Nom[NUM=?n] -> N[] *
1. . . . . [--] [4:5] NP[NUM=?n] -> Nom[NUM=?n] *
1. . . . . [--] [4:5] NP[NUM=?n] -> Nom[NUM=?n] *
1. . . . . [--] [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [--] [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1. . . . . [--] [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . . . . [--] [4:5] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . . . . [--] [4:5] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. . . . . [--] [3:5] NP[NUM=?n] -> PRP[] NP[NUM=?n] *
1. . . . . [--] [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [--] [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1. . . . . [--] [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . . . . [--] [3:5] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . . . . [--] [3:5] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. . . . . [--] [2:5] PP[] -> IN[] NP[] *
1. . . . . [--] [2:5] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n]
1. . . . . [--] [2:5] S[] -> PP[] * COMMA[] NP[NUM=?n] INTRO[] S[] {}
1. . . . . [--] [2:5] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
1. . . . . [--] [2:5] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
1. [-----> |] [1:5] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
1. [-----> |] [1:5] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1. [=====|] [0:5] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1. [=====|] [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1. [=====|] [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
<generator object FeatureChart.parases at 0x7fdaf97bbf90>

Process finished with exit code 0

```

Figure 4. Challenge File 1 result: 'John ate at his desk'.

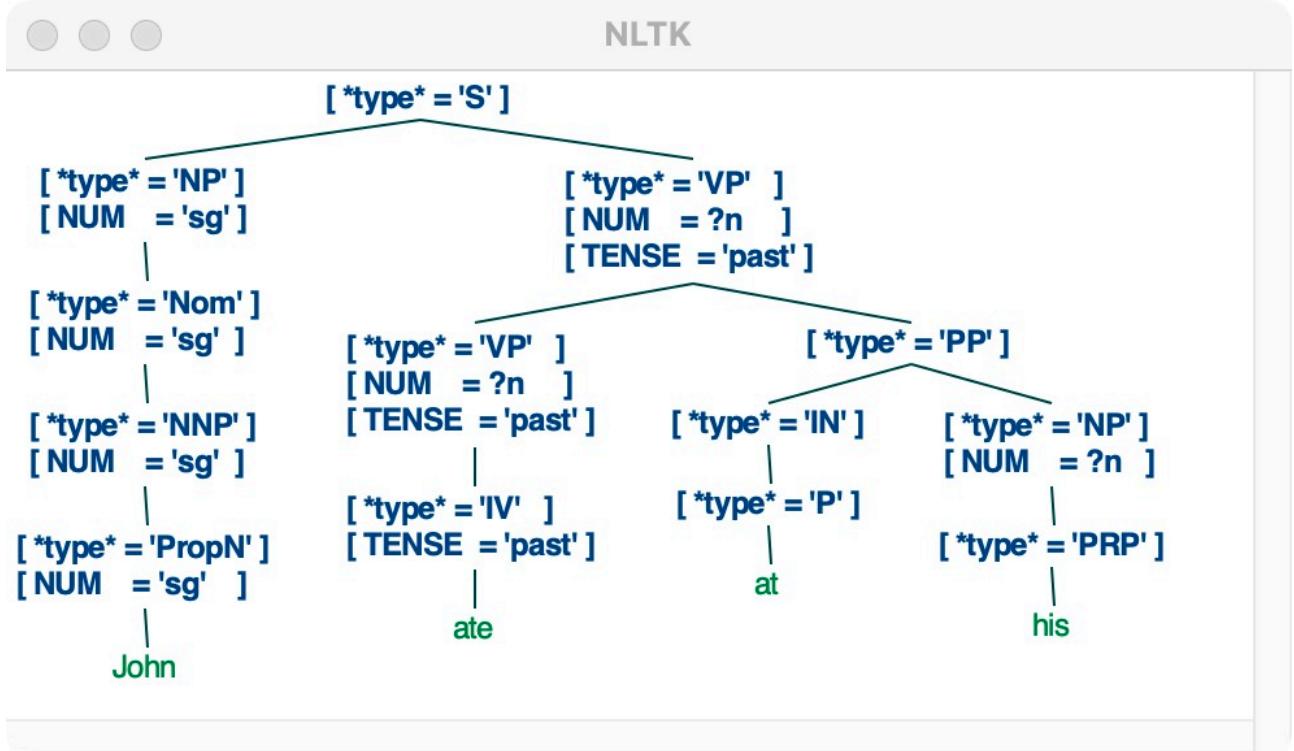


Figure 5. Challenge File 1 result: 'John ate at his desk'.

1.2. Challange File 2

Given: Finally, O'Malley ate the crunchy apple on the table.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 5 ~ 12** shown below.

```

Run: PreProcess (1)
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
Finally, O'Malley ate the crunchy apple on the table.

Options to the results: save/print
Do you want to save the parse tree? N
Do you want to print the parse tree? Y

[Sentences Splitting]
["Finally, O'Malley ate the crunchy apple on the table."]

[POS Tagging]
[("Finally", "RB"), (',', ','), ("O'Malley", "NNP"), ("ate", "VBP"), ("the", "DT"), ("crunchy", "NN"), ("apple", "NN"), ("on", "IN"), ("the", "DT"), ("table", "NN")]

[Name Entities]
set()

[Earley Parsing]
(S[])
    (RB[] Finally)
    (COMMA[],)
    (NP[NUM='sg']
        (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] O'Malley))))
        (VP[NUM=?n, TENSE='past']
            (VP[NUM=?n, TENSE='past']
                (TV[TENSE='past'] ate)
                (NP[NUM=?n]
                    (DT[NUM=?n] (Det[NUM=?n] the))
                    (JJ[] crunchy)
                    (NP[NUM=?n] (Nom[NUM=?n] (N[NUM='sg'] (NN[] apple))))))
            (PP[])
                (IN[] (P[] on))
                (NP[NUM=?n]
                    (DT[NUM=?n] (Det[NUM=?n] the))
                    (Nom[NUM=?n] (N[NUM='sg'] (NN[] table)))))
        (S[])
            (RB[] Finally)
            (COMMA[],)

```

Figure 5. Challenge File 2 result: 'Finally, O'Malley ate the crunchy apple on the table'.

```

[Earley Parse Process]
|F.O.a.t.c.a.o.t.t.| 
|[-] . . . . . | [0:1] 'Finally'
| . [-] . . . . . | [1:2] 'O'Malley'
| . . [-] . . . . | [2:3] 'ate'
| . . . [-] . . . . | [3:4] 'the'
| . . . . [-] . . . | [4:5] 'crunchy'
| . . . . . [-] . . | [5:6] 'apple'
| . . . . . . [-] . | [6:7] 'on'
| . . . . . . . [-] | [7:8] 'the'
| . . . . . . . [-] | [8:9] 'table'
|[-] . . . . . . | [0:1] RB[] -> 'Finally' *
|[=> . . . . . . | [0:1] S[] -> RB[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
|[=> . . . . . . | [0:1] VP[NUM=?n, TENSE=?t] -> RB[] * TV[NUM=?n, TENSE=?t] NP[] {}
| . [-] . . . . . . | [1:2] PropN[NUM='sg'] -> 'O'Malley' *
| . [-] . . . . . . | [1:2] NN(P[NUM='sg']) -> PropN[NUM='sg'] *
| . [-] . . . . . . | [1:2] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
| . [-] . . . . . . | [1:2] Nom[NUM='sg'] -> NNP[NUM='sg'] *

```

Figure 6. Challenge File 2 result: 'Finally, O'Malley ate the crunchy apple on the table'.

Run: PreProcess (1) ×

```

1. [-] . . . . . | [1:2] PropN[NUM='sg'] -> 'OMalley' *
1. [-] . . . . . | [1:2] NNP[NUM='sg'] -> PropN[NUM='sg'] *
1. [-] . . . . . | [1:2] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1. [-] . . . . . | [1:2] Nom[NUM='sg'] -> NNP[NUM='sg'] *
1. [-] . . . . . | [1:2] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n: 'sg'}
1. [-] . . . . . | [1:2] NP[NUM='sg'] -> Nom[NUM='sg'] *
1. [-] . . . . . | [1:2] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
1. [-] . . . . . | [1:2] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
1. [-] . . . . . | [1:2] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1. [-] . . . . . | [1:2] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1. [-] . . . . . | [1:2] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
1. [-] . . . . . | [2:3] TV[TENSE='past'] -> 'ate' *
1. [-] . . . . . | [2:3] IV[TENSE='past'] -> 'ate' *
1. [-] . . . . . | [2:3] VP[NUM=?n, TENSE=?t] -> IV[TENSE=?t] * TO[] VP[TENSE='inf'] {?t: 'past'}
1. [-] . . . . . | [2:3] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] *
1. [-] . . . . . | [2:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1. [-] . . . . . | [2:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * VP[] {?n3: Variable('?n'), ?t: 'past'}
1. [-] . . . . . | [1:3] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1. [-] . . . . . | [1:3] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n: 'sg', ?n2: 'sg'}
1. [-] . . . . . | [1:3] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1. [-] . . . . . | [2:3] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'past'}
1. [-] . . . . . | [1:3] S[] -> NP[NUM=?n] * TV[NUM=?n] * INTRO[] S[] {?n: 'sg'}
1. [-] . . . . . | [1:3] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
1. [-] . . . . . | [3:4] Det[NUM=?n] -> 'the' *
1. [-] . . . . . | [3:4] DT[NUM=?n] -> Det[NUM=?n] *
1. [-] . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n2: Variable('?n')}
1. [-] . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n3: Variable('?n')}
1. [-] . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * JJ[] NP[NUM=?n] {?n2: Variable('?n')}
1. [-] . . . . . | [4:5] JJ[] -> 'crunchy' *
1. [-] . . . . . | [4:5] DATE[] -> JJ[] * WEEK[] {}
1. [-] . . . . . | [3:5] NP[NUM=?n] -> DT[NUM=?n] JJ[] * NP[NUM=?n] {?n2: Variable('?n')}
1. . . . . | [5:6] NN[] -> 'apple' *
1. . . . . | [5:6] N[NUM='sg'] -> NN[] *
1. . . . . | [5:6] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1. . . . . | [5:6] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
1. . . . . | [5:6] Nom[NUM=?n] -> N[] *
1. . . . . | [5:6] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
1. . . . . | [5:6] NP[NUM=?n] -> Nom[NUM=?n] *
```

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Figure 7. Challenge File 2 result: ‘Finally, O’Malley ate the crunchy apple on the table’.

Run: PreProcess (1) ×

```

1. . . . . [-] . . . | [5:6] NN[] -> 'apple' *
1. . . . . [-] . . . | [5:6] N[NUM='sg'] -> NN[] *
1. . . . . [-] . . . | [5:6] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1. . . . . [-] . . . | [5:6] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
1. . . . . [-] . . . | [5:6] Nom[NUM=?n] -> N[] *
1. . . . . [-] . . . | [5:6] NP[NUM=?n] -> Non[NUM=?n] * PP[] {?n2: Variable('?n')}
1. . . . . [-] . . . | [5:6] NP[NUM=?n] -> Non[NUM=?n] *
1. . . . . [-] . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [-] . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1. . . . . [-] . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . . . . [-] . . . | [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . . . . [-] . . . | [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. . . . . [-] . . . | [3:6] NP[NUM=?n] -> DT[NUM=?n] JJ[] NP[NUM=?n] *
1. . . . . [-] . . . | [3:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [-] . . . | [3:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1. . . . . [-] . . . | [3:6] S[] -> NP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . . . . [-] . . . | [3:6] S[] -> NP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . . . . [-] . . . | [3:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. . . . . [-] . . . | [2:6] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
1. . . . . [-] . . . | [2:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1. . . . . [-] . . . | [2:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
1. . . . . [-] . . . | [1:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1. . . . . [-] . . . | [1:6] S[] -> NP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1. . . . . [-] . . . | [6:7] P[] -> 'on' *
1. . . . . [-] . . . | [6:7] IN[] -> P[] *
1. . . . . [-] . . . | [6:7] PP[] -> IN[] * NP[] {}
1. . . . . [-] . . . | [6:7] PP[] -> IN[] * DATE[] {}
1. . . . . [-] . . . | [7:8] Det[NUM=?n] -> 'the' *
1. . . . . [-] . . . | [7:8] DT[NUM=?n] -> Det[NUM=?n] *
1. . . . . [-] . . . | [7:8] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n2: Variable('?n')}
1. . . . . [-] . . . | [7:8] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n3: Variable('?n')}
1. . . . . [-] . . . | [7:8] NP[NUM=?n] -> DT[NUM=?n] * JJ[] NP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [-] . . . | [8:9] NN[] -> 'table' *
1. . . . . [-] . . . | [8:9] N[NUM='sg'] -> NN[] *
1. . . . . [-] . . . | [8:9] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1. . . . . [-] . . . | [8:9] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
1. . . . . [-] . . . | [8:9] Nom[NUM=?n] -> N[] *
```

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Figure 8. Challenge File 2 result: ‘Finally, O’Malley ate the crunchy apple on the table’.

Run: PreProcess (1) ▾

```

I. . . . . [-] [8:9] NN[] -> 'table' *
I. . . . . [-] [8:9] N[NUM='sg'] -> NN[] *
I. . . . . [->] [8:9] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
I. . . . . [->] [8:9] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
I. . . . . [-] [8:9] Nom[NUM=?n] -> N[] *
I. . . . . [->] [8:9] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
I. . . . . [-] [8:9] NP[NUM=?n] -> Nom[NUM=?n] *
I. . . . . [->] [7:9] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
I. . . . . [->] [7:9] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . . . [->] [7:9] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [->] [7:9] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [7:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [7:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . . [->] [7:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [6:9] PP[] -> IN[] NP[] *
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
I. . . . . [->] [6:9] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
I. . . . . [->] [5:9] NP[NUM=?n] -> Nom[NUM=?n] PP[] *
I. . . . . [->] [2:9] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. . . . . [->] [1:9] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] {*n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n3: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [3:9] NP[NUM=?n] -> DT[NUM=?n] JJ[] NP[NUM=?n] *
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [2:9] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *

```

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Figure 9. Challenge File 2 result: ‘Finally, O’Malley ate the crunchy apple on the table’.

Run: PreProcess (1) ▾

```

I. . . . . [->] [6:9] PP[] -> IN[] NP[] *
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . . . [->] [6:9] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
I. . . . . [->] [6:9] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
I. . . . . [->] [5:9] NP[NUM=?n] -> Nom[NUM=?n] PP[] *
I. . . . . [->] [2:9] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. . . . . [->] [1:9] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] {*n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n3: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [5:9] S[] -> NP[NUM=?n] * VP[NUM=?n] TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
I. . . . . [->] [3:9] NP[NUM=?n] -> DT[NUM=?n] JJ[] NP[NUM=?n] *
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . . [->] [3:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [->] [2:9] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. . . . . [->] [2:9] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. . . . . [->] [1:9] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [1:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . . [->] [8:9] S[] -> NP[NUM=?n] {*n2: Variable('?n')}
I. . . . . [->] [8:9] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [8:9] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [->] [8:9] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . . [->] [8:9] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}

```

generator object FeatureChart_parses at 0x7fbfd8836350>

Process finished with exit code 0

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Figure 10. Challenge File 2 result: ‘Finally, O’Malley ate the crunchy apple on the table’.

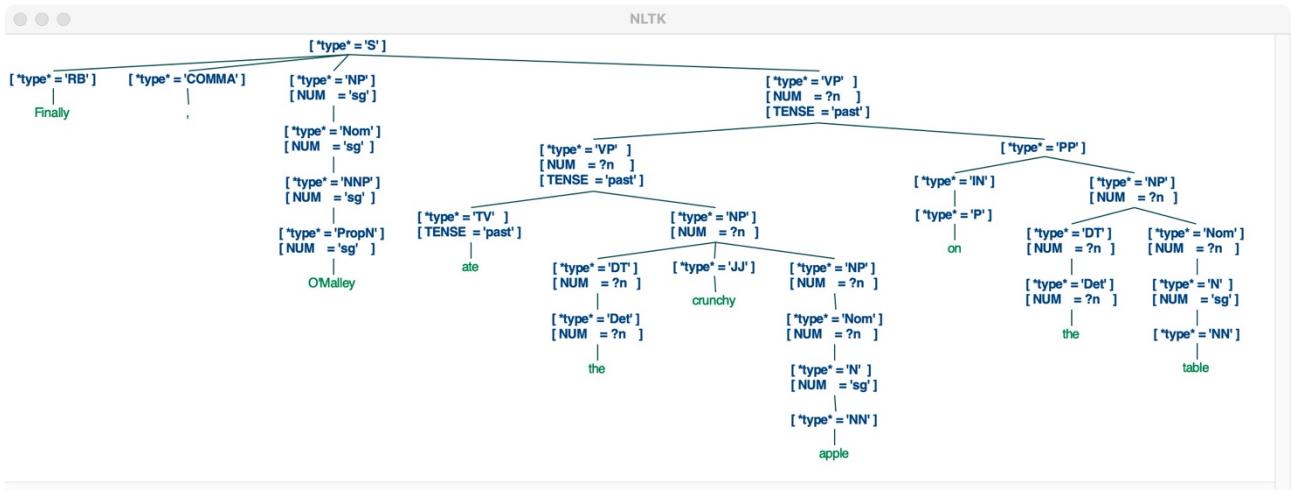


Figure 11. Challenge File 2 result: 'Finally, O'Malley ate the crunchy apple on the table'.

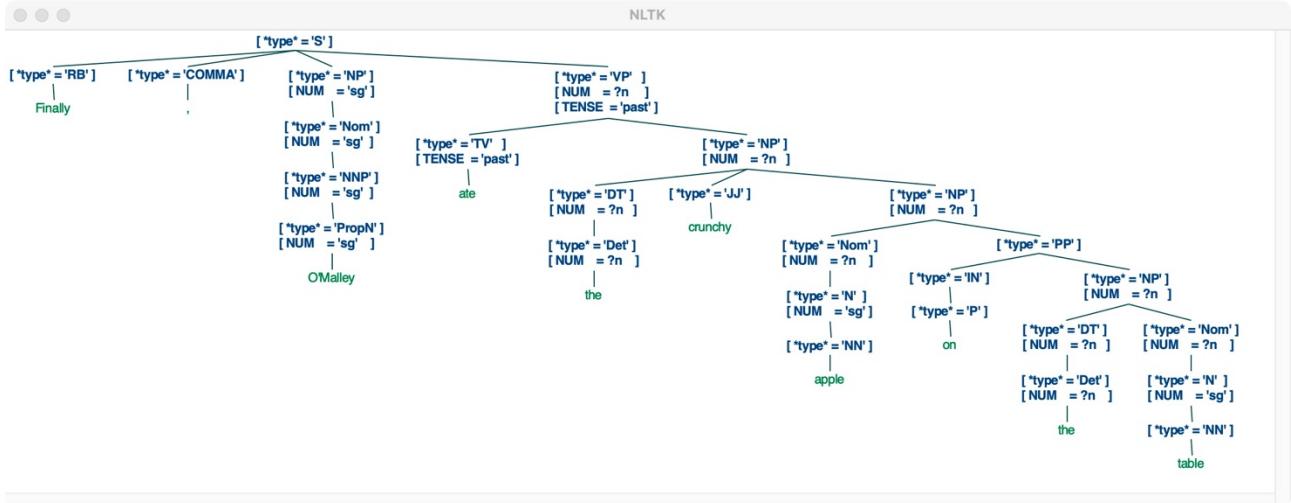


Figure 12. Challenge File 2 result: 'Finally, O'Malley ate the crunchy apple on the table'.

1.3. Challange File 3

Given: Sue intended to share the fridge with John and Mary.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 13 ~ 20** shown below.

```

Run: PreProcess (1) ×
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
Sue intended to share the fridge with John and Mary.

Options to the results: save/print
Do you want to save the parse tree? N
Do you want to print the parse tree? Y

[Sentences Splitting]
['Sue intended to share the fridge with John and Mary.']

[POS Tagging]
[['Sue', 'NNP'], ['intended', 'VBD'], ['to', 'TO'], ['share', 'NN'], ['the', 'DT'], ['fridge', 'NN'], ['with', 'IN'], ['John', 'NNP'], ['and', 'CC'], ['Mary', 'NNP']]]

[Name Entities]
{'Mary', 'John', 'Sue'}

[Earley Parsing]
(S[]
  (NP[NUM='sg']
    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
  (VP[NUM=?n, TENSE='past']
    (VP[NUM=?n, TENSE='past']
      (IV[TENSE='past'] intended)
      (TO[] to)
      (VP[NUM=?n, TENSE='inf']
        (TV[TENSE='inf'] share)
        (NP[NUM=?n]
          (DT[NUM=?n] (Det[NUM=?n] the))
          (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))))
    (PP[])
      (IN[] (P[] with))
      (NP[NUM='sg']
        (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
      (CC[] and)
      (NP[NUM='sg']
        (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
  (S[]
    (NP[NUM='sg']
      (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
    (VP[NUM=?n, TENSE='past']
      (IV[TENSE='past'] intended)
      (TO[] to)
      (VP[NUM=?n, TENSE='inf']
        (VP[NUM=?n, TENSE='inf']
          (TV[TENSE='inf'] share)
          (NP[NUM=?n]
            (DT[NUM=?n] (Det[NUM=?n] the))
            (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))))
        (PP[])
          (IN[] (P[] with))
          (NP[NUM='sg']
            (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
          (CC[] and)
          (NP[NUM='sg']
            (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
      (S[]
        (NP[NUM='sg']
          (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
        (VP[NUM=?n, TENSE='past']
          (IV[TENSE='past'] intended)
          (TO[] to)
          (VP[NUM=?n, TENSE='inf']
            (VP[NUM=?n, TENSE='inf']
              (TV[TENSE='inf'] share)
              (NP[NUM=?n]
                (NP[NUM=?n]
                  (DT[NUM=?n] (Det[NUM=?n] the))
                  (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
            (PP[])
              (IN[] (P[] with))
              (NP[NUM='sg']
                (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
              (CC[] and)
              (NP[NUM='sg']
                (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
          (S[])
            (NP[NUM='sg'])
              (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))................................................................

```

Figure 13. Challenge File 3 result: 'Sue intended to share the fridge with John and Mary'.

```

Run: PreProcess (1) ×
(S[]
  (NP[NUM='sg']
    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
  (VP[NUM=?n, TENSE='past']
    (VP[NUM=?n, TENSE='past']
      (IV[TENSE='past'] intended)
      (TO[] to)
      (VP[NUM=?n, TENSE='inf']
        (VP[NUM=?n, TENSE='inf']
          (TV[TENSE='inf'] share)
          (NP[NUM=?n]
            (NP[NUM=?n]
              (DT[NUM=?n] (Det[NUM=?n] the))
              (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))))
        (PP[])
          (IN[] (P[] with))
          (NP[NUM='sg']
            (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
          (CC[] and)
          (NP[NUM='sg']
            (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
      (S[]
        (NP[NUM='sg']
          (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
        (VP[NUM=?n, TENSE='past']
          (IV[TENSE='past'] intended)
          (TO[] to)
          (VP[NUM=?n, TENSE='inf']
            (VP[NUM=?n, TENSE='inf']
              (TV[TENSE='inf'] share)
              (NP[NUM=?n]
                (NP[NUM=?n]
                  (DT[NUM=?n] (Det[NUM=?n] the))
                  (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
            (PP[])
              (IN[] (P[] with))
              (NP[NUM='sg']
                (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
              (CC[] and)
              (NP[NUM='sg']
                (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
          (S[]
            (NP[NUM='sg']
              (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))
            (VP[NUM=?n, TENSE='past']
              (IV[TENSE='past'] intended)
              (TO[] to)
              (VP[NUM=?n, TENSE='inf']
                (VP[NUM=?n, TENSE='inf']
                  (TV[TENSE='inf'] share)
                  (NP[NUM=?n]
                    (NP[NUM=?n]
                      (DT[NUM=?n] (Det[NUM=?n] the))
                      (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
                (PP[])
                  (IN[] (P[] with))
                  (NP[NUM='sg']
                    (NNP[NUM='sg'] (PropN[NUM='sg'] John)))
                  (CC[] and)
                  (NP[NUM='sg']
                    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))))
              (S[])
                (NP[NUM='sg'])
                  (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Sue))))))))))))))))................................................................

```

Figure 14. Challenge File 3 result: 'Sue intended to share the fridge with John and Mary'.

Run: PreProcess (1) ×

```
[Earley Parse Process]
[].....| [0:1] 'Sue'
[].....| [1:2] 'intended'
[].....| [2:3] 'to'
[].....| [3:4] 'share'
[].....| [4:5] 'the'
[].....| [5:6] 'fridge'
[].....| [6:7] 'with'
[].....| [7:8] 'John'
[].....| [8:9] 'and'
[].....| [9:10] 'Mary'
[].....| [0:1] PropN[NUM='sg'] -> 'Sue' *
[].....| [0:1] NNP[NUM='sg'] -> PropN[NUM='sg'] *
[]>.....| [0:1] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
[].....| [0:1] Nom[NUM='sg'] -> NNP[NUM='sg'] *
[]>.....| [0:1] NP[NUM=?n] -> Nom[NUM=?n] PP[] {?n: 'sg'}
[].....| [0:1] NP[NUM='sg'] -> Nom[NUM='sg'] *
[]>.....| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
[]>.....| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
[]>.....| [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[]>.....| [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[]>.....| [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
[].....| [1:2] IV[TENSE='past'] -> 'intended' *
[]>.....| [1:2] VP[NUM=?n, TENSE=?t] -> IV[TENSE=?t] TO[] VP[TENSE='inf'] {?t: 'past'}
[].....| [1:2] VP[NUM=?n, TENSE=?t] -> IV[TENSE='past'] *
[]>.....| [1:2] VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
[]>.....| [1:2] VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
[]>.....| [0:2] S[] -> NP[NUM='sg'] VP[NUM=?n] *
[]>.....| [0:2] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
[]>.....| [0:2] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
[].....| [0:2] P[] -> 'to' *
[].....| [2:3] TO[] -> 'to' *
[]>.....| [2:3] TO[] -> 'to' *
[]>.....| [1:3] VP[NUM=?n, TENSE=?t] -> IV[TENSE=?t] TO[] * VP[TENSE='inf'] {?t: 'past'}
[].....| [2:3] IN[] -> P[] *
[]>.....| [2:3] PP[] -> IN[] * NP[] {}
[]>.....| [2:3] PP[] -> IN[] * DATE[] {}
[].....| [3:4] TV[TENSE='inf'] -> 'share' *
```

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Figure 15. Challenge File 3 result: ‘Sue intended to share the fridge with John and Mary’.

Run: PreProcess (1) ×

```
[Earley Parse Process]
[].....| [2:3] IN[] -> P[] *
[]>.....| [2:3] PP[] -> IN[] * NP[] {}
[]>.....| [2:3] PP[] -> IN[] * DATE[] {}
[].....| [3:4] TV[TENSE='inf'] -> 'share' *
[]>.....| [3:4] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'inf'}
[].....| [4:5] Det[NUM=?n] -> 'the' *
[].....| [4:5] DT[NUM=?n] -> Det[NUM=?n] *
[]>.....| [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n2: Variable('?n')}
[]>.....| [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n3: Variable('?n')}
[]>.....| [4:5] NP[NUM=?n] -> DT[NUM=?n] * JJ[] NP[NUM=?n] {?n2: Variable('?n')}
[].....| [5:6] NN[] -> 'fridge' *
[].....| [5:6] N[NUM='sg'] -> NN[] *
[]>.....| [5:6] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
[]>.....| [5:6] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
[].....| [5:6] Nom[NUM=?n] -> N[] *
[]>.....| [5:6] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
[]>.....| [5:6] NP[NUM=?n] -> Nom[NUM=?n] *
[].....| [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
[]>.....| [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[]>.....| [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] *
[]>.....| [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[]>.....| [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[]>.....| [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[]>.....| [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[]>.....| [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[]>.....| [3:6] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
[]>.....| [3:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[]>.....| [3:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[]>.....| [1:6] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *
[]>.....| [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
[]>.....| [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
[]>.....| [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
[]>.....| [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
[]>.....| [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[]>.....| [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[]>.....| [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
```

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Figure 16. Challenge File 3 result: ‘Sue intended to share the fridge with John and Mary’.

Run: PreProcess (1) ×

```

1.....[>...| [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1.....[>...| [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1.....[>...| [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1.....[>...| [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1.....[>...| [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1.....[>...| [6:7] P[] -> 'with' *
1.....[>...| [6:7] IN[] -> P[] *
1.....[>...| [6:7] PP[] -> IN[] * NP[] {}
1.....[>...| [6:7] PP[] -> IN[] * DATE[] {}
1.....[>...| [7:8] PropN[NUM='sg'] -> 'John' *
1.....[>...| [7:8] NP[NUM='sg'] -> PropN[NUM='sg'] *
1.....[>...| [7:8] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1.....[>...| [7:8] Nom[NUM='sg'] -> NNP[NUM='sg'] *
1.....[>...| [7:8] NP[NUM='sg'] -> Nom[NUM='sg'] *
1.....[>...| [7:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
1.....[>...| [7:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
1.....[>...| [7:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1.....[>...| [7:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1.....[>...| [7:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
1.....[->...| [6:8] PP[] -> IN[] NP[] *
1.....[>...| [6:8] S[] -> PP[] * COMM[] NP[NUM=?n] VP[NUM=?n] {}
1.....[>...| [6:8] S[] -> PP[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
1.....[>...| [6:8] S[] -> PP[] * COMM[] DATE[] COMM[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
1.....[>...| [6:8] DATE[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
1.....[->...| [5:8] NP[NUM=?n] -> Nom[NUM=?n] PP[] *
1.....[>...| [4:8] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] PP[] *
1.....[>...| [3:8] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *
1.....[>...| [1:8] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
1.....[>...| [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1.....[>...| [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
1.....[>...| [0:8] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1.....[>...| [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1.....[>...| [0:8] S[] -> NP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1.....[>...| [3:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
1.....[>...| [3:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
1.....[>...| [1:8] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *
1.....[>...| [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}

```

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Figure 17. Challenge File 3 result: ‘Sue intended to share the fridge with John and Mary’.

Run: PreProcess (1) ×

```

1.....[>...| [1:8] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *
1.....[>...| [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1.....[>...| [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
1.....[>...| [0:8] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1.....[>...| [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1.....[>...| [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1.....[>...| [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n3: Variable('?n')}
1.....[>...| [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1.....[>...| [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1.....[>...| [4:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1.....[>...| [3:8] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
1.....[>...| [3:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
1.....[>...| [3:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
1.....[>...| [1:8] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *
1.....[>...| [5:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1.....[>...| [5:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1.....[>...| [5:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1.....[>...| [5:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1.....[>...| [8:9] CC[] -> 'and' *
1.....[>...| [8:9] S[] -> CC[] * NP[NUM=?n] VP[NUM=?n] {}
1.....[>...| [7:9] NP[NUM=?n] -> NNP[NUM=?n] CC[] * NP[NUM=?n] {?n: 'sg'}
1.....[>...| [8:9] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] * TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1.....[>...| [9:10] PropN[NUM='sg'] -> 'Mary' *
1.....[>...| [9:10] NNP[NUM='sg'] -> PropN[NUM='sg'] *
1.....[>| [9:10] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
1.....[>| [9:10] Nom[NUM='sg'] -> NNP[NUM='sg'] *
1.....[>| [9:10] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n: 'sg'}
1.....[>| [9:10] NP[NUM='sg'] -> Nom[NUM='sg'] *
1.....[>| [9:10] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
1.....[>| [9:10] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
1.....[>| [9:10] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1.....[>| [9:10] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
1.....[>| [9:10] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
1.....[>| [8:10] S[] -> CC[] NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
1.....[->...| [7:10] NP[NUM='sg'] -> NNP[NUM='sg'] CC[] NP[NUM='sg'] *
1.....[->...| [7:10] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}

```

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Figure 18. Challenge File 3 result: ‘Sue intended to share the fridge with John and Mary’.

Figure 19. Challenge File 3 result: 'Sue intended to share the fridge with John and Mary'.

```
[.....[-->] [6:10] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}  
[.....[-->] [6:10] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}  
[.....[-->] [6:10] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}  
[.....[-->] [5:10] NP[NUM=?n] -> Nom[NUM=?n] PP[] *  
[.....[-->] [4:10] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] PP[] *  
[.....[-->] [3:10] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *  
[.....[-->] [1:10] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *  
[.....[-->] [1:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}  
[.....[-->] [1:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}  
[=====] [0:10] S[] -> NP[NUM='sg'] VP[NUM='sg'] *  
[.....[-->] [0:10] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}  
[.....[-->] [0:10] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}  
[.....[-->] [5:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}  
[.....[-->] [3:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}  
[.....[-->] [1:10] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *  
[.....[-->] [1:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}  
[.....[-->] [1:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}  
[=====] [0:10] S[] -> NP[NUM='sg'] VP[NUM='sg'] *  
[.....[-->] [0:10] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}  
[.....[-->] [0:10] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}  
[.....[-->] [4:10] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}  
[.....[-->] [4:10] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}  
[.....[-->] [4:10] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}  
[.....[-->] [4:10] S[] -> NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}  
[.....[-->] [4:10] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}  
[.....[-->] [3:10] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *  
[.....[-->] [3:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}  
[.....[-->] [3:10] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}  
[.....[-->] [1:10] VP[NUM=?n, TENSE='past'] -> IV[TENSE='past'] TO[] VP[TENSE='inf'] *  
[.....[-->] [5:10] S[] -> NP[NUM=?n] VP[NUM=?n] {?n2: Variable('?n')}  
[.....[-->] [5:10] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}  
[.....[-->] [5:10] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}  
[.....[-->] [5:10] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}  
[.....[-->] [5:10] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}  
<generator object FeatureChart.parses at 0x7ffec26f9580>
```

Figure 20. Challenge File 3 result: ‘Sue intended to share the fridge with John and Mary’.

1.4. Challange File 4

Given: Mary put apples in the fridge last Monday.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 21 ~ 31** shown below.

```

Run: PreProcess (1)
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
Mary put apples in the fridge last Monday.

Options to the results: save/print
Do you want to save the parse tree? n
Do you want to print the parse tree? y

[Sentences Splitting]
['Mary put apples in the fridge last Monday.']

[POS Tagging]
[('Mary', 'NNP'), ('put', 'VBD'), ('apples', 'NNS'), ('in', 'IN'), ('the', 'DT'), ('fridge', 'NN'), ('last', 'JJ'), ('Monday', 'NNP')]

[Name Entities]
{'Mary'}

[Earley Parsing]
(S[])
  (NP[NUM='sg']
    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
  (VP[NUM=?n, TENSE='past']
    (VP[NUM=?n, TENSE='past']
      (TV[TENSE='past'] put)
      (NP[NUM=?n] (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))
    (PP[])
      (IN[] (P[] in))
      (NP[NUM=?n]
        (DT[NUM=?n] (Det[NUM=?n] the)))
      (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))
    (DATE[] (JJ[] last) (WEEK[] Monday)))
  (S[])
    (NP[NUM='sg']
      (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
    (VP[NUM=?n, TENSE='inf']
      (VP[NUM=?n, TENSE='inf']
        (TV[TENSE='inf'] put)
        (NP[NUM=?n] (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))
      (PP[])
        (IN[] (P[] in))
        (NP[NUM=?n]
          (DT[NUM=?n] (Det[NUM=?n] the)))
        (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))
      (DATE[] (JJ[] last) (WEEK[] Monday)))
    (S[])
      (NP[NUM='sg']
        (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
      (VP[NUM=?n, TENSE='inf']
        (VP[NUM=?n, TENSE='past']
          (TV[TENSE='past'] put)
          (NP[NUM=?n]
            (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
      (PP[])
        (IN[] (P[] in))
        (NP[NUM=?n]
          (DT[NUM=?n] (Det[NUM=?n] the)))
        (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
    (DATE[] (JJ[] last) (WEEK[] Monday)))
  (S[])
    (NP[NUM='sg']
      (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
      (VP[NUM=?n, TENSE='past']
        (VP[NUM=?n, TENSE='past']
          (TV[TENSE='past'] put)
          (NP[NUM=?n]
            (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
        (PP[])
          (IN[] (P[] in))
          (NP[NUM=?n]
            (DT[NUM=?n] (Det[NUM=?n] the)))
          (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
        (DATE[] (JJ[] last) (WEEK[] Monday)))
  (S[])
    (NP[NUM='sg'])
      (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
      (VP[NUM=?n, TENSE='past']
        (VP[NUM=?n, TENSE='past']
          (TV[TENSE='past'] put)
          (NP[NUM=?n]
            (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
        (PP[])
          (IN[] (P[] in))
          (NP[NUM=?n]
            (DT[NUM=?n] (Det[NUM=?n] the)))
          (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
        (DATE[] (JJ[] last) (WEEK[] Monday)))
  )

```

Figure 21. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

```

Run: PreProcess (1)
(S[]
  (NP[NUM='sg']
    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
  (VP[NUM=?n, TENSE='inf']
    (VP[NUM=?n, TENSE='inf']
      (TV[TENSE='inf'] put)
      (NP[NUM=?n] (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))
    (PP[])
      (IN[] (P[] in))
      (NP[NUM=?n]
        (DT[NUM=?n] (Det[NUM=?n] the)))
      (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))
    (DATE[] (JJ[] last) (WEEK[] Monday)))
  (S[])
    (NP[NUM='sg']
      (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
      (VP[NUM=?n, TENSE='inf']
        (VP[NUM=?n, TENSE='inf']
          (TV[TENSE='inf'] put)
          (NP[NUM=?n]
            (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
      (PP[])
        (IN[] (P[] in))
        (NP[NUM=?n]
          (DT[NUM=?n] (Det[NUM=?n] the)))
        (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
      (DATE[] (JJ[] last) (WEEK[] Monday)))
    (S[])
      (NP[NUM='sg']
        (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
        (VP[NUM=?n, TENSE='inf']
          (VP[NUM=?n, TENSE='past']
            (TV[TENSE='past'] put)
            (NP[NUM=?n]
              (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
          (PP[])
            (IN[] (P[] in))
            (NP[NUM=?n]
              (DT[NUM=?n] (Det[NUM=?n] the)))
            (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
          (DATE[] (JJ[] last) (WEEK[] Monday)))
        (S[])
          (NP[NUM='sg']
            (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
            (VP[NUM=?n, TENSE='past']
              (VP[NUM=?n, TENSE='past']
                (TV[TENSE='past'] put)
                (NP[NUM=?n]
                  (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
                  (PP[])
                    (IN[] (P[] in))
                    (NP[NUM=?n]
                      (DT[NUM=?n] (Det[NUM=?n] the)))
                    (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
                  (DATE[] (JJ[] last) (WEEK[] Monday)))
            (S[])
              (NP[NUM='sg'])
                (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
                (VP[NUM=?n, TENSE='past']
                  (VP[NUM=?n, TENSE='past']
                    (TV[TENSE='past'] put)
                    (NP[NUM=?n]
                      (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
                    (PP[])
                      (IN[] (P[] in))
                      (NP[NUM=?n]
                        (DT[NUM=?n] (Det[NUM=?n] the)))
                      (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
                    (DATE[] (JJ[] last) (WEEK[] Monday)))
              (S[])
                (NP[NUM='sg'])
                  (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
                  (VP[NUM=?n, TENSE='past']
                    (VP[NUM=?n, TENSE='past']
                      (TV[TENSE='past'] put)
                      (NP[NUM=?n]
                        (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
                        (PP[])
                          (IN[] (P[] in))
                          (NP[NUM=?n]
                            (DT[NUM=?n] (Det[NUM=?n] the)))
                          (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
                        (DATE[] (JJ[] last) (WEEK[] Monday)))
              (S[])
                (NP[NUM='sg'])
                  (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary))))
                  (VP[NUM=?n, TENSE='past']
                    (VP[NUM=?n, TENSE='past']
                      (TV[TENSE='past'] put)
                      (NP[NUM=?n]
                        (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))))))
                        (PP[])
                          (IN[] (P[] in))
                          (NP[NUM=?n]
                            (DT[NUM=?n] (Det[NUM=?n] the)))
                            (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge)))))))
                          (DATE[] (JJ[] last) (WEEK[] Monday)))
              )

```

Figure 22. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

Run: PreProcess (1) ×

```

(S[])
  (NP[NUM='sg']
    (Nom[NUM='sg'] (NNP[NUM='sg'] (PropN[NUM='sg'] Mary)))
  (VP[NUM=?n, TENSE='past']
    (TV[TENSE='past'] put)
  (NP[NUM=?n]
    (Nom[NUM=?n] (N[NUM='pl'] (NNS[] apples)))
  (PP[])
    (IN[] (P[] in))
  (NP[NUM=?n]
    (DT[NUM=?n] (Det[NUM=?n] the))
  (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))))))
  (DATE[] (JJ[] last) (WEEK[] Monday)))

```

[Earley Parse Process]

```

|.M.p.a.i.t.f.l.M.| 
|[-] . . . . . | [0:1] 'Mary'
|. [-] . . . . . | [1:2] 'put'
|. . [-] . . . . | [2:3] 'apples'
|. . . [-] . . . | [3:4] 'in'
|. . . . [-] . . | [4:5] 'the'
|. . . . . [-] . | [5:6] 'fridge'
|. . . . . [-] . | [6:7] 'last'
|. . . . . . [-] | [7:8] 'Monday'
|[-] . . . . . | [0:1] PropN[NUM='sg'] -> 'Mary' *
|[-] . . . . . | [0:1] NNP[NUM='sg'] -> PropN[NUM='sg'] *
|[-> . . . . . | [0:1] NP[NUM=?n] -> NNP[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
|[-] . . . . . | [0:1] Nom[NUM='sg'] -> NNP[NUM='sg'] *
|[-> . . . . . | [0:1] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n: 'sg'}
|[-] . . . . . | [0:1] NP[NUM='sg'] -> Nom[NUM='sg'] *
|[-> . . . . . | [0:1] NP[NUM=?n] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
|[-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
|[-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
|[-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
|[-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n: 'sg'}
|. [-] . . . . . | [1:2] TV[NUM='pl', TENSE='pres'] -> 'put' *
|. [-] . . . . . | [1:2] TV[TENSE='inf'] -> 'put' *
|. [-] . . . . . | [1:2] TV[TENSE='past'] -> 'put' *

```

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Figure 23. Challenge File 4 result: ‘Mary put apples in the fridge last Monday’.

Run: PreProcess (1) ×

```

|. [-] . . . . . | [1:2] TV[NUM='pl', TENSE='pres'] -> 'put' *
|. [-] . . . . . | [1:2] TV[TENSE='inf'] -> 'put' *
|. [-] . . . . . | [1:2] TV[TENSE='past'] -> 'put' *
|. [-> . . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'past'}
|. [-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] {?n: 'sg'}
|[-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
|. [-> . . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'inf'}
|[-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] {?n: 'sg'}
|[-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
|. [-> . . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?n: 'pl', ?t: 'pres'}
|. [-] . . . . . | [2:3] NNS[] -> 'apples' *
|. [-] . . . . . | [2:3] N[NUM='pl'] -> NNS[] *
|. [-> . . . . . | [2:3] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'pl'}
|. [-> . . . . . | [2:3] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
|. [-] . . . . . | [2:3] Nom[NUM=?n] -> N[] *
|. [-> . . . . . | [2:3] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
|. [-] . . . . . | [2:3] NP[NUM=?n] -> Nom[NUM=?n] *
|. [-> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
|. [-> . . . . . | [2:3] S[] -> NP[NUM=?n] TV[NUM=?n] DATE[] {?n3: Variable('?n')}
|. [-> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
|. [-> . . . . . | [2:3] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
|. [-> . . . . . | [2:3] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
|. [-> . . . . . | [1:3] VP[NUM='pl', TENSE='pres'] -> TV[NUM='pl', TENSE='pres'] NP[] *
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n: 'pl', ?t: 'pres'}
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
|[-> . . . . . | [0:3] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
|[-> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
|[-> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
|. [-> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
|[-> . . . . . | [0:3] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
|[-> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
|[-> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
|. . . [-] . . . . | [3:4] P[] -> 'in' *
|. . . [-] . . . . | [3:4] IN[] -> P[] *

```

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Figure 24. Challenge File 4 result: ‘Mary put apples in the fridge last Monday’.

Run: PreProcess (1) ✘

```

I. . . . [-] . . . . | [3:4] P[] -> 'in' *
I. . . . [-] . . . . | [3:4] IN[] -> P[] *
I. . . . [-] . . . . | [3:4] PP[] -> IN[] * NP[] {}
I. . . . [-] . . . . | [3:4] PP[] -> IN[] * DATE[] {}
I. . . . [-] . . . . | [4:5] Det[NUM=?n] -> 'the' *
I. . . . [-] . . . . | [4:5] DT[NUM=?n] -> Det[NUM=?n] *
I. . . . [-] . . . . | [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n2: Variable('?n')}
I. . . . [-] . . . . | [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n3: Variable('?n')}
I. . . . [-] . . . . | [4:5] NP[NUM=?n] -> DT[NUM=?n] * JJ[] NP[NUM=?n] {?n2: Variable('?n')}
I. . . . [-] . . . . | [5:6] NN[] -> 'fridge' *
I. . . . [-] . . . . | [5:6] N[NUM='sg'] -> NN[] *
I. . . . [-] . . . . | [5:6] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
I. . . . [-] . . . . | [5:6] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
I. . . . [-] . . . . | [5:6] Nom[NUM=?n] -> N[] *
I. . . . [-] . . . . | [5:6] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [5:6] NP[NUM=?n] -> Nom[NUM=?n] *
I. . . . [-] . . . . | [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
I. . . . [-] . . . . | [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . . [-] . . . . | [4:6] NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . [-] . . . . | [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . [-] . . . . | [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . [-] . . . . | [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [3:6] PP[] -> IN[] NP[] *
I. . . . [-] . . . . | [3:6] S[] -> PP[] * COMM[] NP[NUM=?n] VP[NUM=?n] {}
I. . . . [-] . . . . | [3:6] S[] -> PP[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . . [-] . . . . | [3:6] DATE[] -> PP[] * COMM[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
I. . . . [-] . . . . | [2:6] NP[NUM=?n] -> Nom[NUM=?n] PP[] *
I. . . . [-] . . . . | [1:6] VP[NUM='pl', TENSE='pres'] -> VP[NUM='pl', TENSE='pres'] PP[] *
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE='past'] -> VP[NUM=?n, TENSE='past'] PP[] *
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n: 'pl', ?t: 'pres'}
I. . . . [-] . . . . | [2:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . [-] . . . . | [2:6] S[] -> NP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . [-] . . . . | [2:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [2:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: CC[] IN[] S[] {?n2: Variable('?n')}}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
I. . . . [-] . . . . | [1:6] VP[NUM='pl', TENSE='pres'] -> TV[NUM='pl', TENSE='pres'] NP[] *
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n: 'pl', ?t: 'pres'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. . . . [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. . . . [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . [-] . . . . | [6:7] JJ[] -> 'last' *
I. . . . [-] . . . . | [6:7] DATE[] -> JJ[] * WEEK[] {}
I. . . . [-] . . . . | [7:8] WEEK[] -> 'Monday' *
I. . . . [-] . . . . | [7:8] DATE[] -> WEEK[] *
I. . . . [-] . . . . | [6:8] DATE[] -> JJ[] WEEK[] *

```

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Figure 25. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

Run: PreProcess (1) ✘

```

I. [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
I. [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n: 'pl', ?t: 'pres'}
I. [-] . . . . | [2:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. [-] . . . . | [2:6] S[] -> NP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. [-] . . . . | [2:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. [-] . . . . | [2:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: CC[] IN[] S[] {?n2: Variable('?n')}}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
I. [-] . . . . | [1:6] VP[NUM='pl', TENSE='pres'] -> TV[NUM='pl', TENSE='pres'] NP[] *
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n: 'pl', ?t: 'pres'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
I. [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
I. [-] . . . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
I. [-] . . . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
I. [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. [-] . . . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
I. [-] . . . . | [6:7] JJ[] -> 'last' *
I. [-] . . . . | [6:7] DATE[] -> JJ[] * WEEK[] {}
I. [-] . . . . | [7:8] WEEK[] -> 'Monday' *
I. [-] . . . . | [7:8] DATE[] -> WEEK[] *
I. [-] . . . . | [6:8] DATE[] -> JJ[] WEEK[] *

```

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Figure 26. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

Run: PreProcess (1) ×

```

1. . [-----> . . | [2:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . [-----> . . | [2:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . [-----> . . | [2:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. [-----> . . | [1:6] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
1. [-----> . . | [1:6] VP[NUM=?n, TENSE='past'] -> TV[NUM=?n, TENSE='past'] NP[] *
1. [-----> . . | [1:6] VP[NUM=?n, TENSE='pres'] -> TV[NUM=?n, TENSE='pres'] NP[] *
1. [-----> . . | [1:6] VP[NUM=?n, TENSE='pres'] -> TV[NUM=?n, TENSE='pres'] PP[] {?n: 'p1', ?t: 'pres'}
1. [-----> . . | [1:6] VP[NUM=?n, TENSE='pres'] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
1. [-----> . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
1[-----> . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1[-----> . . | [0:6] VP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1[-----> . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1. [-----> . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'past'}
1. [-----> . . | [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'past'}
1[-----> . . | [0:6] S[] -> NP[NUM='sg'] VP[NUM='sg'] *
1[-----> . . | [0:6] VP[NUM=?n] VP[NUM=?n] * DATE[] {?n: 'sg', ?n2: 'sg'}
1[-----> . . | [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg', ?n2: 'sg'}
1. . . . . [> . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
1. . . . . [> . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
1. . . . . [> . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
1. . . . . [> . . | [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
1. . . . . [> . . | [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
1. . . . . [-] | [6:7] JJ[] -> 'last' *
1. . . . . [-] | [6:7] DATE[] -> JJ[] * WEEK[] *
1. . . . . [-] | [7:8] WEEK[] -> 'Monday' *
1. . . . . [-] | [7:8] DATE[] -> WEEK[] *
1. . . . . [-] | [6:8] DATE[] -> JJ[] WEEK[] *
1. . . . . [-] | [6:8] S[] -> DATE[] * COMM[] VP[NUM=?n] VP[NUM=?n] {}
1. . . . . [->] | [6:8] S[] -> DATE[] * COMM[] PP[] COMM[] VP[NUM=?n] VP[NUM=?n] {}
1. . . . . [->] | [6:8] S[] -> DATE[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
1[=====>] | [6:8] S[] -> NP[NUM='sg'] VP[NUM='sg'] DATE[] *
1. . . . . [>] | [7:8] S[] -> DATE[] * COMM[] NP[NUM=?n] VP[NUM=?n] {}
1. . . . . [>] | [7:8] S[] -> DATE[] * COMM[] PP[] COMM[] NP[NUM=?n] VP[NUM=?n] {}
1. . . . . [>] | [7:8] S[] -> DATE[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}

<generator object FeatureChart.parsee at 0x7fd3df6f8f6d0>

Process finished with exit code 0

```

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Figure 27. Challenge File 4 result: ‘Mary put apples in the fridge last Monday’.

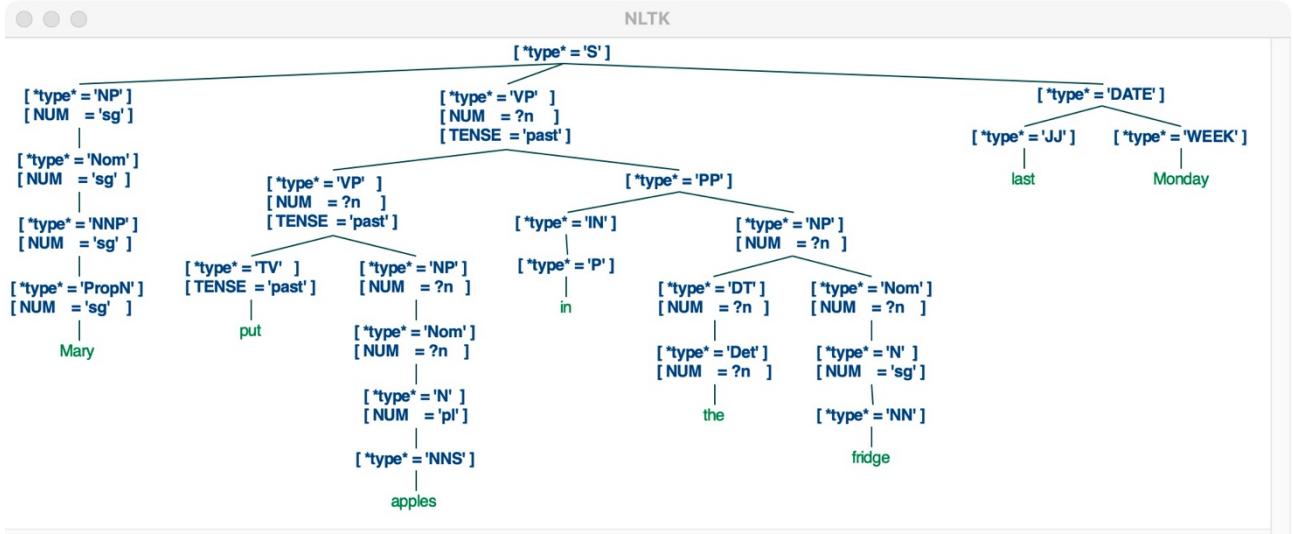


Figure 28. Challenge File 4 result: ‘Mary put apples in the fridge last Monday’.

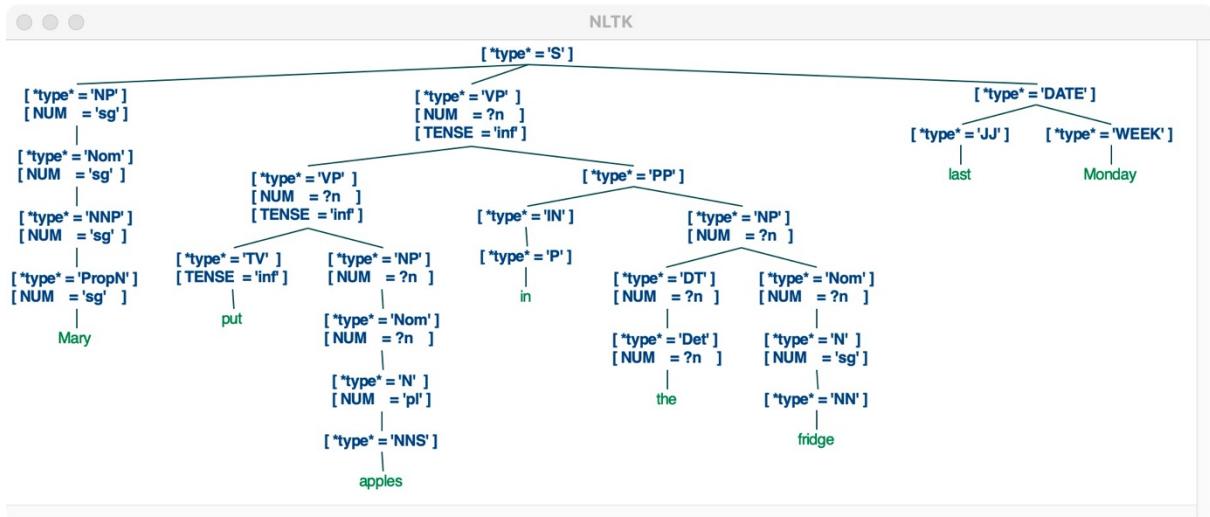


Figure 29. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

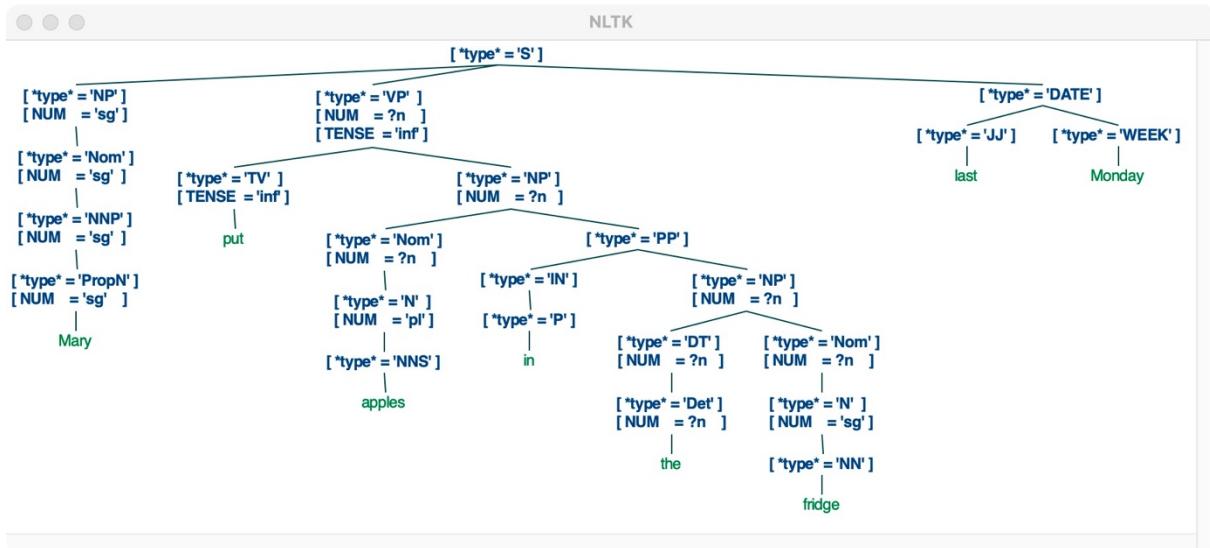


Figure 30. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

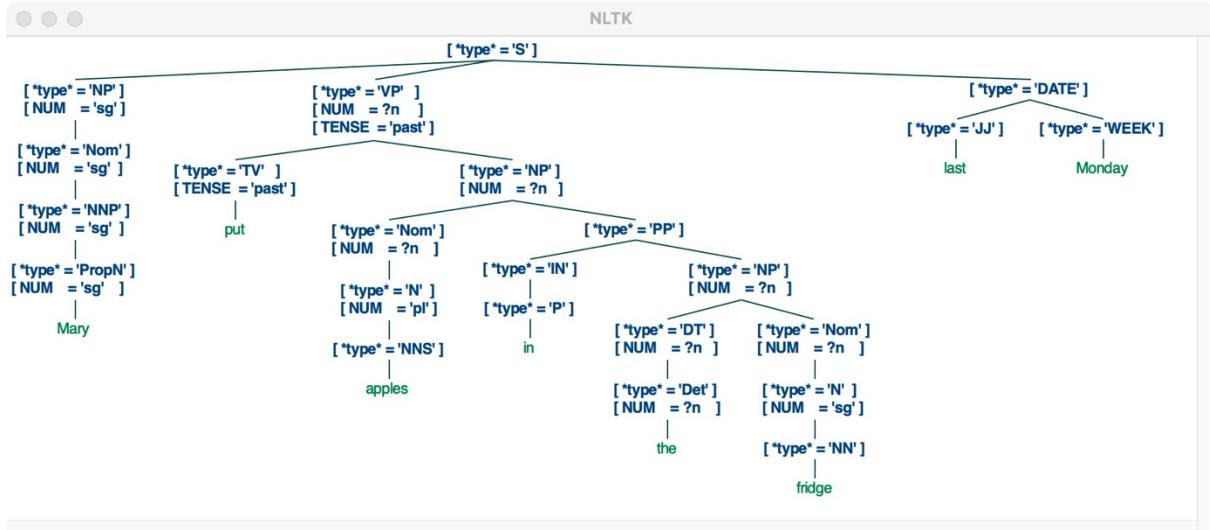


Figure 31. Challenge File 4 result: 'Mary put apples in the fridge last Monday'.

1.5. Challange File 5

Given: I promise you an apple for September 2021.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 32 ~ 39** shown below.

```

Run: PreProcess (1)
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
I promise you an apple for September 2021.

Options to the results: save/print?
Do you want to save the parse tree? N
Do you want to print the parse tree? Y

[Sentences Splitting]
['I promise you an apple for September 2021.']

[POS Tagging]
[('I', 'PRP'), ('promise', 'VBP'), ('you', 'PRP'), ('an', 'DT'), ('apple', 'NN'), ('for', 'IN'), ('September', 'NNP'), ('2021', 'CD')]

[Name Entities]
set()

[Earley Parsing]
(S[])
  (NP[NUM=?n] (PRP[] I))
  (VP[NUM=?n, TENSE='inf']
    (VP[NUM=?n, TENSE='inf']
      (TV[TENSE='inf'] promise)
      (NP[NUM='sg'])
      (PRP[] you)
      (NP[NUM='sg'])
      (DT[NUM='sg'] (Det[NUM='sg'] an))
      (Nom[NUM=?n] (N[NUM='sg'] (NN[] apple))))))
  (PP[])
    (IN[] (P[] for))
    (DATE[] (MONTH_STR[] September) (YEAR[] 2021)))
(S[])
  (NP[NUM=?n] (PRP[] I))
  (VP[NUM=?n, TENSE='inf']
    (TV[TENSE='inf'] promise)
    (NP[NUM='sg'])
    (PRP[] you)
    (NP[NUM='sg']))
  (PP[])
    (IN[] (P[] for))
    (DATE[] (MONTH_STR[] September) (YEAR[] 2021))))

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```

Figure 32. Challenge File 5 result: 'I promise you an apple for September 2021'.

```

Run: PreProcess (1)
(S[])
  (NP[NUM=?n] (PRP[] I))
  (VP[NUM=?n, TENSE='inf']
    (TV[TENSE='inf'] promise)
    (NP[NUM='sg'])
    (PRP[] you)
    (NP[NUM='sg'])
    (DT[NUM='sg'] (Det[NUM='sg'] an))
    (Nom[NUM=?n] (N[NUM='sg'] (NN[] apple))))
  (PP[])
    (IN[] (P[] for))
    (DATE[] (MONTH_STR[] September) (YEAR[] 2021)))

[Earley Parse Process]
| I.p.y.a.a.f.S.2.1
| [-] . . . . . | [0:1] 'I'
| . [-] . . . . | [1:2] 'promise'
| . . [-] . . . . | [2:3] 'you'
| . . . [-] . . . | [3:4] 'an'
| . . . . [-] . . | [4:5] 'apple'
| . . . . . [-] . | [5:6] 'for'
| . . . . . [-] | [6:7] 'September'
| . . . . . [-] | [7:8] '2021'
| [-] . . . . . | [0:1] PRP[] -> 'I' *
| [-] . . . . . | [0:1] NP[NUM=?n] -> PRP[] *
| [-> . . . . . | [0:1] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
| [-> . . . . . | [0:1] NP[NUM=?n] -> PRP[] * DATE[] PP[] {}
| [-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
| [-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
| [-> . . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
| [-> . . . . . | [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
| [-> . . . . . | [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
| . [-] . . . . . | [1:2] TV[TENSE='inf'] -> 'promise' *
| . [-] . . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> TV[NUM=?n, TENSE=?t] * NP[] {?t: 'inf'}
| [-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] {?n3: Variable('?n')}
| [-> . . . . . | [0:2] S[] -> NP[NUM=?n] TV[NUM=?n] * INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
| . [-] . . . . . | [2:3] PRP[] -> 'you' *

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```

Figure 33. Challenge File 5 result: 'I promise you an apple for September 2021'.

Run: PreProcess (1) ×

```

I. . . [--> . . . . . | [2:3] NP[NUM=?n] -> PRP[] *
I. . . [> . . . . . | [2:3] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
I. . . [> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . [> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . [> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . [> . . . . . | [2:3] S[] -> NP[NUM=?n] * VP[NUM=?n] IN[] S[] {?n3: Variable('?n')}
I. . . [> . . . . . | [2:3] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . [> . . . . . | [1:3] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
I. . . [> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. . . [> . . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
I. . . [> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] IN[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [3:4] Det[NUM='sg'] -> 'an' *
I. . . [> . . . . . | [3:4] DT[NUM='sg'] -> Det[NUM='sg'] *
I. . . [> . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n: 'sg'}
I. . . [> . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n: 'sg'}
I. . . [> . . . . . | [3:4] NP[NUM=?n] -> DT[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
I. . . [> . . . . . | [4:5] NN[] -> 'apple' *
I. . . [> . . . . . | [4:5] N[NUM='sg'] -> NN[] *
I. . . [> . . . . . | [4:5] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
I. . . [> . . . . . | [4:5] Non[NUM=?n] -> N[] * Nom[NUM=?n] {}
I. . . [> . . . . . | [4:5] Non[NUM=?n] -> N[] *
I. . . [> . . . . . | [4:5] Non[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
I. . . [> . . . . . | [4:5] Non[NUM=?n] -> Nom[NUM=?n] *
I. . . [> . . . . . | [3:5] NP[NUM='sg'] -> DT[NUM='sg'] Nom[NUM='sg'] *
I. . . [> . . . . . | [3:5] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n: 'sg', ?n2: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] IN[] S[] {?n: 'sg'}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] * VP[NUM=?n] *
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] IN[] S[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [1:5] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
I. . . [> . . . . . | [1:5] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. . . [> . . . . . | [1:5] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
I. . . [> . . . . . | [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [0:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] IN[] S[] {?n3: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] *
I. . . [> . . . . . | [5:6] P[] -> 'for' *
I. . . [> . . . . . | [5:6] IN[] -> P[] *
I. . . [> . . . . . | [5:6] PP[] -> IN[] * NP[] {}
I. . . [> . . . . . | [5:6] PP[] -> IN[] * DATE[] {}
I. . . [> . . . . . | [6:7] MONTH_STR[] -> 'September' *
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * DAY[] SEP[] YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * DAY[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * NN_NUM[] SEP[] YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * NN_NUM[] {}
I. . . [> . . . . . | [7:8] YEAR[] -> '2021' *
I. . . [> . . . . . | [7:8] DATE[] -> YEAR[] * SEP[] MONTH_NUM[] SEP[] DAY[] {}
I. . . [> . . . . . | [7:8] DATE[] -> YEAR[] *
I. . . [> . . . . . | [6:8] DATE[] -> MONTH_STR[] YEAR[] *
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] PP[] COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . [> . . . . . | [5:8] PP[] -> IN[] DATE[] *
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
```

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Figure 34. Challenge File 5 result: 'I promise you an apple for September 2021'.

Run: PreProcess (1) ×

```

I. . . [---> . . . . . | [2:5] NP[NUM='sg'] -> PRP[] NP[NUM='sg'] *
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n: 'sg'}
I. . . [> . . . . . | [2:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . [> . . . . . | [3:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] * VP[NUM=?n] IN[] S[] {?n3: Variable('?n')}
I. . . [> . . . . . | [4:5] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [5:6] S[] -> NP[NUM=?n] VP[NUM=?n] *
I. . . [> . . . . . | [5:6] P[] -> 'for' *
I. . . [> . . . . . | [5:6] IN[] -> P[] *
I. . . [> . . . . . | [5:6] PP[] -> IN[] * NP[] {}
I. . . [> . . . . . | [5:6] PP[] -> IN[] * DATE[] {}
I. . . [> . . . . . | [6:7] MONTH_STR[] -> 'September' *
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * DAY[] SEP[] YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * DAY[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * NN_NUM[] SEP[] YEAR[] {}
I. . . [> . . . . . | [6:7] DATE[] -> MONTH_STR[] * NN_NUM[] {}
I. . . [> . . . . . | [7:8] YEAR[] -> '2021' *
I. . . [> . . . . . | [7:8] DATE[] -> YEAR[] * SEP[] MONTH_NUM[] SEP[] DAY[] {}
I. . . [> . . . . . | [7:8] DATE[] -> YEAR[] *
I. . . [> . . . . . | [6:8] DATE[] -> MONTH_STR[] YEAR[] *
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] PP[] COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [6:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . [> . . . . . | [5:8] PP[] -> IN[] DATE[] *
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . [> . . . . . | [5:8] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
```

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Figure 35. Challenge File 5 result: 'I promise you an apple for September 2021'.

```
PreProcess (1) >
[. . . . . [-----] | [5:8] PP[] -> IN[] DATE[] *  
[. . . . . [-----] | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}  
[. . . . . [-----] | [5:8] S[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}  
[. . . . . [-----] | [5:8] S[] -> PP[] * COMMA[] DATE[] COMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}  
[. . . . . [-----] | [5:8] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}  
[. . . . . [-----] | [4:8] NP[NUM=?n] -> Nom[NUM=?n] PP[] *  
[. . . . . [-----] | [3:8] NP[NUM='sg'] -> DT[NUM='sg'] Nom[NUM='sg'] PP[] *  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}  
[=====] | [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] *  
[=====] | [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}  
[=====] | [0:8] S[] -> NP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}  
[. . . . . [-----] | [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}  
[. . . . . [-----] | [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}  
[. . . . . [-----] | [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}  
[. . . . . [-----] | [3:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}  
[. . . . . [-----] | [3:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}  
[. . . . . [-----] | [2:8] NP[NUM='sg'] -> PP[] NP[NUM='sg'] *  
[. . . . . [-----] | [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}  
[. . . . . [-----] | [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}  
[. . . . . [-----] | [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}  
[. . . . . [-----] | [2:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}  
[. . . . . [-----] | [2:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}  
[. . . . . [-----] | [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}  
[=====] | [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] *  
[=====] | [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}  
[=====] | [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}  
[. . . . . [-----] | [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}  
[. . . . . [-----] | [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}  
[. . . . . [-----] | [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}  
[. . . . . [-----] | [4:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}  
[. . . . . [-----] | [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] VP[NUM=?n] {}  
[. . . . . [-----] | [>] [7:8] S[] -> DATE[] * COMMA[] PP[] COMMA[] NP[NUM=?n] VP[NUM=?n] {}  
[. . . . . [-----] | [>] [7:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
```

Figure 36. Challenge File 5 result: ‘I promise you an apple for September 2021’.

```
[PreProcess (1) <-->] [5:8] DATE[] -> PP[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
[. . . . . [->] [4:8] NP[NUM=?n] -> Nom[NUM=?n] PP[] *
[. . . [->] [3:8] NP[NUM='sg'] -> DT[NUM='sg'] Nom[NUM='sg'] PP[] *
[. [->] [1:8] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[. [->] [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[. [->] [1:8] S[] -> NP[NUM=?n] VP[NUM=?n] *
[[=====]] [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[[----->] [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[. . . [->] [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
[. . . [->] [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
[. . . [->] [3:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[. . . [->] [3:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[. . . [->] [3:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
[. . . [->] [2:8] NP[NUM='sg'] -> PRP[] NP[NUM='sg'] *
[. . [->] [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n: 'sg'}
[. . [->] [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n: 'sg'}
[. . [->] [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n: 'sg'}
[. . [->] [2:8] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n: 'sg'}
[. . [->] [2:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n: 'sg'}
[. [->] [1:8] VP[NUM=?n, TENSE='inf'] -> TV[NUM=?n, TENSE='inf'] NP[] *
[. [->] [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[. [->] [1:8] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[. [->] [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] *
[[=====]] [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[[----->] [0:8] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[. . . [->] [4:8] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[. . . [->] [>] [7:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] VP[NUM=?n] {}
[. . . . . [>] [7:8] S[] -> DATE[] * COMMA[] PP[] COMMA[] NP[NUM=?n] VP[NUM=?n] {}
[. . . . . [>] [7:8] S[] -> DATE[] * COMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
<generator object FeatureChart.parses at 0x7fc54ac7d6d0>
```

Figure 37. Challenge File 5 result: 'I promise you an apple for September 2021'.

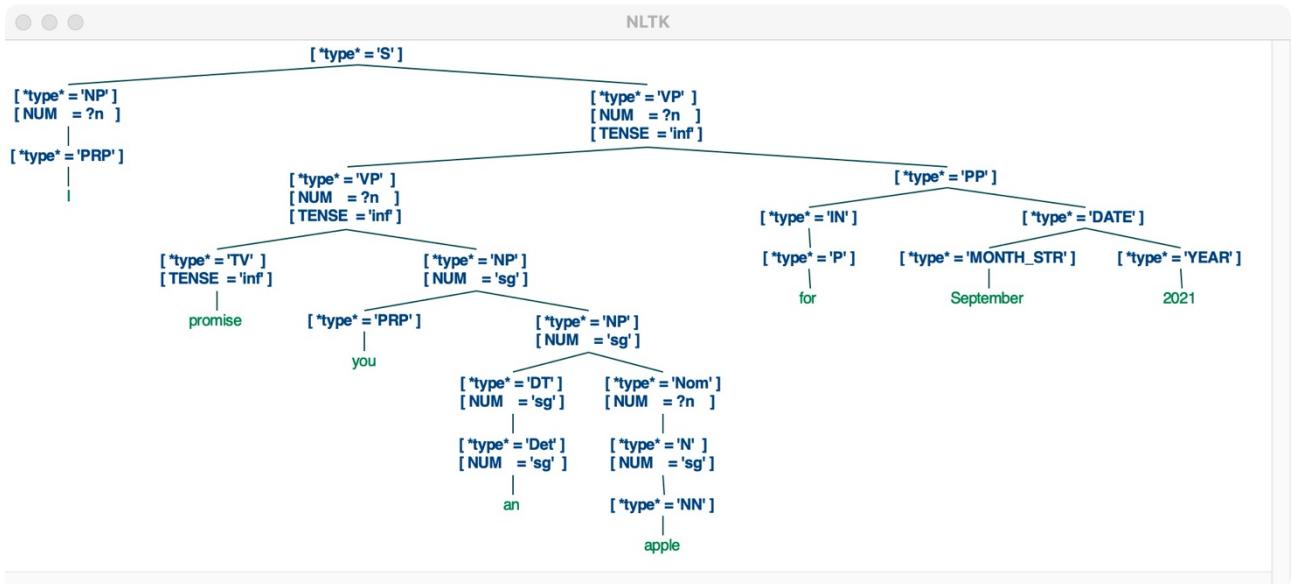


Figure 38. Challenge File 5 result: 'I promise you an apple for September 2021'.

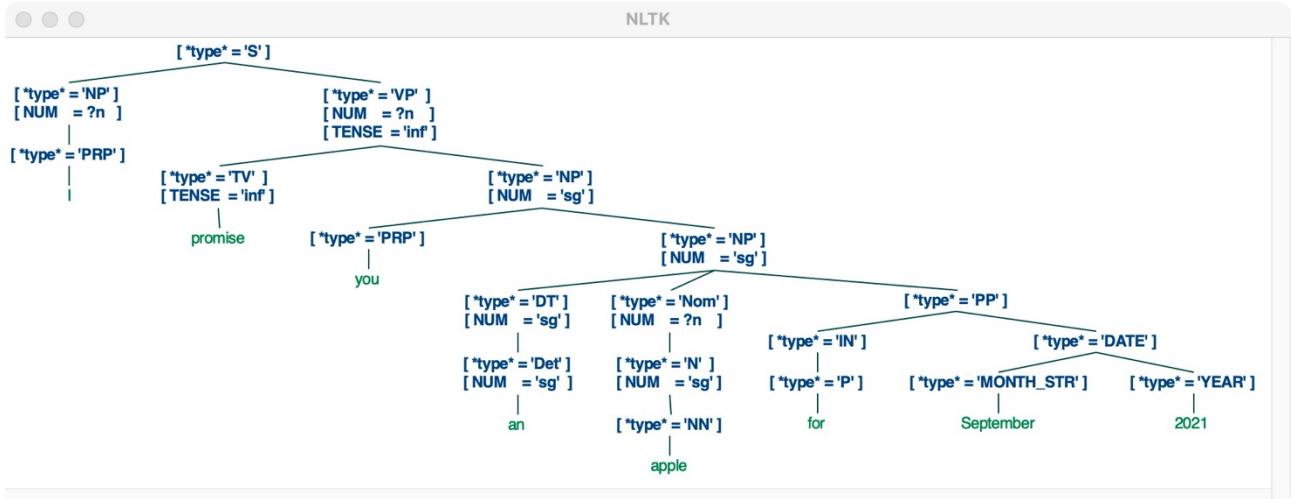


Figure 39. Challenge File 5 result: 'I promise you an apple for September 2021'.

1.6. Challange File 6

Given: It will be in the office fridge.

When: The validation data correctly input.

Result: Program can run successfully, and the text preprocess pipeline and proofreading results given.

Conclusion: The program can preprocess and proofread the text content. Sentences split, pos tag, name entity, Earley parse and Earley parse process results are displayed as **Figures 40 ~ 39** shown below.

```

Run: PreProcess (1) ×
/usr/local/bin/python3.9 /Users/zouhaochen/PycharmProjects/COMP_6751/Project2/PreProcess.py
Please enter the text you want to parse:
It will be in the office fridge.

Options to the results: save/print
Do you want to save the parse tree? N
Do you want to print the parse tree? Y

[Sentences Splitting]
['It will be in the office fridge.']

[POS Tagging]
[ [('It', 'PRP'), ('will', 'MD'), ('be', 'VB'), ('in', 'IN'), ('the', 'DT'), ('office', 'NN'), ('fridge', 'NN') ] ]

[Name Entities]
set()

[Earley Parsing]
(S[])
  (NP[NUM=?n] (PRP[] It))
  (VP[NUM=?n, TENSE='inf']
    (VP[NUM=?n, TENSE='inf']
      (MD[TENSE='inf'] will)
      (AUX[TENSE='inf'] be))
    (PP[]
      (IN[] (P[] in))
      (NP[NUM=?n]
        (DT[NUM=?n] (Det[NUM=?n] the))
        (Nom[NUM=?n]
          (N[NUM='sg'] (NN[] office))
          (Nom[NUM=?n] (N[NUM='sg'] (NN[] fridge))))))))
  (PP[])
  (IN[] (P[] in))

[I.I.w.b.i.t.o.f.]
[[-] . . . . | [0:1] 'It'
[-] . . . . | [1:2] 'will'
[-] . . . . | [2:3] 'be'
[-] . . . . | [3:4] 'in'
[-] . . . . | [4:5] 'the'
[-] . . . . | [5:6] 'office'
[-] . . . . | [6:7] 'fridge'
[-] . . . . | [0:1] PRP[] -> 'It' *
[-] . . . . | [0:1] NP[NUM=?n] -> PRP[] *
[|-> . . . . | [0:1] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
[|-> . . . . | [0:1] NP[NUM=?n] -> PRP[] * DATE[] PP[] {}
[|-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
[|-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[|-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[|-> . . . . | [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[|-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {?n2: Variable('?n')}
[-] . . . . | [1:2] MD[TENSE='inf'] -> 'will' *
[-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * TV[TENSE='inf'] NP[] RB[] {?t: 'inf'}
[-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * TV[TENSE='inf'] NP[] {?t: 'inf'}
[-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * AUX[TENSE='inf'] JJ[] {?t: 'inf'}
[-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * AUX[TENSE='inf'] {?t: 'inf'}
[-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * IV[TENSE='inf'] {?t: 'inf'}
[-] . [-] . . | [2:3] AUX[TENSE='inf'] -> 'be' *
[-] . [-] . . | [2:3] VP[NUM=?n, TENSE=?t] -> AUX[TENSE=?t] * JJ[] {?t: 'inf'}
[-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] AUX[TENSE='inf'] * JJ[] {?t: 'inf'}
[-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] *
[-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[-] . [-] . . | [3:4] P[] -> 'in' *
[-] . [-] . . | [3:4] IN[] -> P[] *
[-] . [-> . . . . | [3:4] PP[] -> IN[] * NP[] {}
[-] . [-> . . . . | [3:4] PP[] -> IN[] * DATE[] {}
[-] . [-] . . | [4:5] Det[NUM=?n] -> 'the' *

```

Figure 40. Challenge File 6 result: 'It will be in the office fridge'.

```

Run: Earley Parse Process
| I.I.w.b.i.t.o.f.
| [-] . . . . | [0:1] 'It'
| [-] . . . . | [1:2] 'will'
| [-] . . . . | [2:3] 'be'
| [-] . . . . | [3:4] 'in'
| [-] . . . . | [4:5] 'the'
| [-] . . . . | [5:6] 'office'
| [-] . . . . | [6:7] 'fridge'
| [-] . . . . | [0:1] PRP[] -> 'It' *
| [-] . . . . | [0:1] NP[NUM=?n] -> PRP[] *
| [-> . . . . | [0:1] NP[NUM=?n] -> PRP[] * NP[NUM=?n] {}
| [-> . . . . | [0:1] NP[NUM=?n] -> PRP[] * DATE[] PP[] {}
| [-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
| [-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
| [-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
| [-> . . . . | [0:1] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
| [-> . . . . | [0:1] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
| [-] . . . . | [1:2] MD[TENSE='inf'] -> 'will' *
| [-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * TV[TENSE='inf'] NP[] RB[] {?t: 'inf'}
| [-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * TV[TENSE='inf'] NP[] {?t: 'inf'}
| [-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * AUX[TENSE='inf'] JJ[] {?t: 'inf'}
| [-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * AUX[TENSE='inf'] {?t: 'inf'}
| [-] . > . . . . | [1:2] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] * IV[TENSE='inf'] {?t: 'inf'}
| [-] . [-] . . | [2:3] AUX[TENSE='inf'] -> 'be' *
| [-] . [-] . . | [2:3] VP[NUM=?n, TENSE=?t] -> AUX[TENSE=?t] * JJ[] {?t: 'inf'}
| [-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> MD[TENSE=?t] AUX[TENSE='inf'] * JJ[] {?t: 'inf'}
| [-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
| [-] . [-> . . . . | [1:3] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
| [-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] *
| [-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
| [-] . [-> . . . . | [0:3] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
| [-] . [-] . . | [3:4] P[] -> 'in' *
| [-] . [-] . . | [3:4] IN[] -> P[] *
| [-] . [-> . . . . | [3:4] PP[] -> IN[] * NP[] {}
| [-] . [-> . . . . | [3:4] PP[] -> IN[] * DATE[] {}
| [-] . [-] . . | [4:5] Det[NUM=?n] -> 'the' *

```

Figure 41. Challenge File 6 result: 'It will be in the office fridge'.

```

Run: PreProcess (1) ✘
[...]
[+] . . . . [-] . . [4:5] Det[NUM=?n] -> 'the' *
[...] . . . . [-] . . [4:5] DT[NUM=?n] -> Det[NUM=?n] *
[...] . . . . [-] . . [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] {?n2: Variable('?n')}
[...] . . . . [-] . . [4:5] NP[NUM=?n] -> DT[NUM=?n] * Nom[NUM=?n] PP[] {?n3: Variable('?n')}
[...] . . . . [-] . . [4:5] NP[NUM=?n] -> DT[NUM=?n] * JJ[] NP[NUM=?n] {?n2: Variable('?n')}
[...] . . . . [-] . . [5:6] NN[] -> 'office' *
[...] . . . . [-] . . [5:6] N[NUM=?sg] -> NN[] *
[...] . . . . [-] . . [5:6] NP[NUM=?n] -> N[NUM=?n] * CC[] NP[NUM=?n] {?n: 'sg'}
[...] . . . . [-] . . [5:6] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
[...] . . . . [-] . . [5:6] Nom[NUM=?n] -> N[] *
[...] . . . . [-] . . [5:6] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
[...] . . . . [-] . . [5:6] NP[NUM=?n] -> Nom[NUM=?n] *
[...] . . . . [-] . . [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
[...] . . . . [-] . . [4:6] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [4:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [3:6] PP[] -> IN[] NP[]
[...] . . . . [-] . . [3:6] S[] -> PP[] * COMMMA[] NP[NUM=?n] VP[NUM=?n] {}
[...] . . . . [-] . . [3:6] S[] -> PP[] * COMMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
[...] . . . . [-] . . [3:6] S[] -> PP[] * COMMMA[] DATE[] COMMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
[...] . . . . [-] . . [3:6] DATE[] -> PP[] * COMMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
[...] . . . . [-] . . [1:6] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *
[...] . . . . [-] . . [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[...] . . . . [-] . . [1:6] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] *
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] * PP[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [1:7] NN[] -> 'fridge' *
[...] . . . . [-] . . [6:7] N[NUM=?sg] -> NN[] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> N[NUM=?n] *
[...] . . . . [-] . . [6:7] NN[] -> 'fridge' *
Run: Commit 4: Git 3: TODO 4: Run Python Console Terminal

```

Figure 42. Challenge File 6 result: 'It will be in the office fridge'.

```

Run: PreProcess (1) ✘
[...]
[+] . . . . [-] . . [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
[...] . . . . [-] . . [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[...] . . . . [-] . . [5:6] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [5:6] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [6:7] NN[] -> 'fridge' *
[...] . . . . [-] . . [6:7] N[NUM=?sg] -> NN[] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> N[NUM=?n] *
[...] . . . . [-] . . [6:7] Nom[NUM=?n] -> N[] * Nom[NUM=?n] {}
[...] . . . . [-] . . [6:7] Nom[NUM=?n] -> N[] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> NP[NUM=?n] * PP[] {?n2: Variable('?n')}
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> NP[NUM=?n] *
[...] . . . . [-] . . [6:7] Nom[NUM=?n] -> NP[NUM=?n] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> NP[NUM=?n] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
[...] . . . . [-] . . [6:7] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [6:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [3:7] PP[] -> IN[] NP[]
[...] . . . . [-] . . [3:7] S[] -> PP[] * COMMMA[] NP[NUM=?n] VP[NUM=?n] {}
[...] . . . . [-] . . [3:7] S[] -> PP[] * COMMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
[...] . . . . [-] . . [3:7] S[] -> PP[] * COMMMA[] DATE[] COMMMA[] NP[NUM=?n] TV[NUM=?n] NP[NUM=?n] INTRO[] S[] {}
[...] . . . . [-] . . [3:7] DATE[] -> PP[] * COMMMA[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
[...] . . . . [-] . . [1:7] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *
[...] . . . . [-] . . [1:7] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
[...] . . . . [-] . . [1:7] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] *
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] * DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] * CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] * PP[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n3: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
[...] . . . . [-] . . [0:7] S[] -> NP[NUM=?n] * VP[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n3: Variable('?n')}
Run: Commit 4: Git 3: TODO 4: Run Python Console Terminal

```

Figure 43. Challenge File 6 result: 'It will be in the office fridge'.

Run: PreProcess (1) ×

```

I. . . . . [-] [6:7] Nom[NUM=?n] -> N[] *
I. . . . . [->] [6:7] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
I. . . . . [-] [6:7] NP[NUM=?n] -> Nom[NUM=?n] *
I. . . . . [---] [5:7] Nom[NUM=?n] -> N[] Nom[NUM=?n] *
I. . . . . [---] [5:7] NP[NUM=?n] -> Nom[NUM=?n] * PP[] {?n2: Variable('?n')}
I. . . . . [---] [5:7] NP[NUM=?n] -> Nom[NUM=?n] *
I. . . . . [----] [4:7] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] *
I. . . . . [---->] [4:7] NP[NUM=?n] -> DT[NUM=?n] Nom[NUM=?n] * PP[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . . . [----] [4:7] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {?n3: Variable('?n')}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {?n2: Variable('?n')}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {*}
I. . . . . [---->] [4:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {*}
I. . . . . [---->] [3:7] S[] -> PP[] * COMM[] NP[NUM=?n] VP[NUM=?n] {}
I. . . . . [---->] [3:7] S[] -> PP[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . . . [---->] [3:7] S[] -> NP[NUM=?n] DATE[] COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] {}
I. . . . . [---->] [3:7] DATE[] -> PP[] * COMM[] NP[NUM=?n] TV[NUM=?n] INTRO[] S[] MONTH_STR[] NN_NUM[] YEAR[] {}
I. . . . . [----->] [1:7] VP[NUM=?n, TENSE='inf'] -> VP[NUM=?n, TENSE='inf'] PP[] *
I. . . . . [----->] [1:7] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n2: Variable('?n'), ?t: 'inf'}
I. . . . . [----->] [1:7] VP[NUM=?n, TENSE=?t] -> VP[NUM=?n, TENSE=?t] * PP[] {?n3: Variable('?n'), ?t: 'inf'}
[=====] [0:7] S[] -> VP[NUM=?n] *
[=====] [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] DATE[] {?n2: Variable('?n'), ?n3: Variable('?n')}
[=====] [0:7] S[] -> NP[NUM=?n] VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n'), ?n3: Variable('?n')}
I. . . . . [--->] [5:7] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [--->] [5:7] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [--->] [5:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {?n2: Variable('?n')}
I. . . . . [--->] [5:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {*}
I. . . . . [--->] [5:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] IN[] S[] {*}
I. . . . . [->] [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] {?n2: Variable('?n')}
I. . . . . [->] [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] DATE[] {?n3: Variable('?n')}
I. . . . . [->] [6:7] S[] -> NP[NUM=?n] * VP[NUM=?n] CC[] TV[NUM=?n] INTRO[] S[] {*}
I. . . . . [->] [6:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] {*}
I. . . . . [->] [6:7] S[] -> NP[NUM=?n] * TV[NUM=?n] INTRO[] S[] CC[] IN[] S[] {*}
<generator object FeatureChart.parsetree at 0x7feedee7bd60>

```

Process finished with exit code 0

Commit Git TODO Run Python Console Terminal

Figure 44. Challenge File 6 result: ‘It will be in the office fridge’.

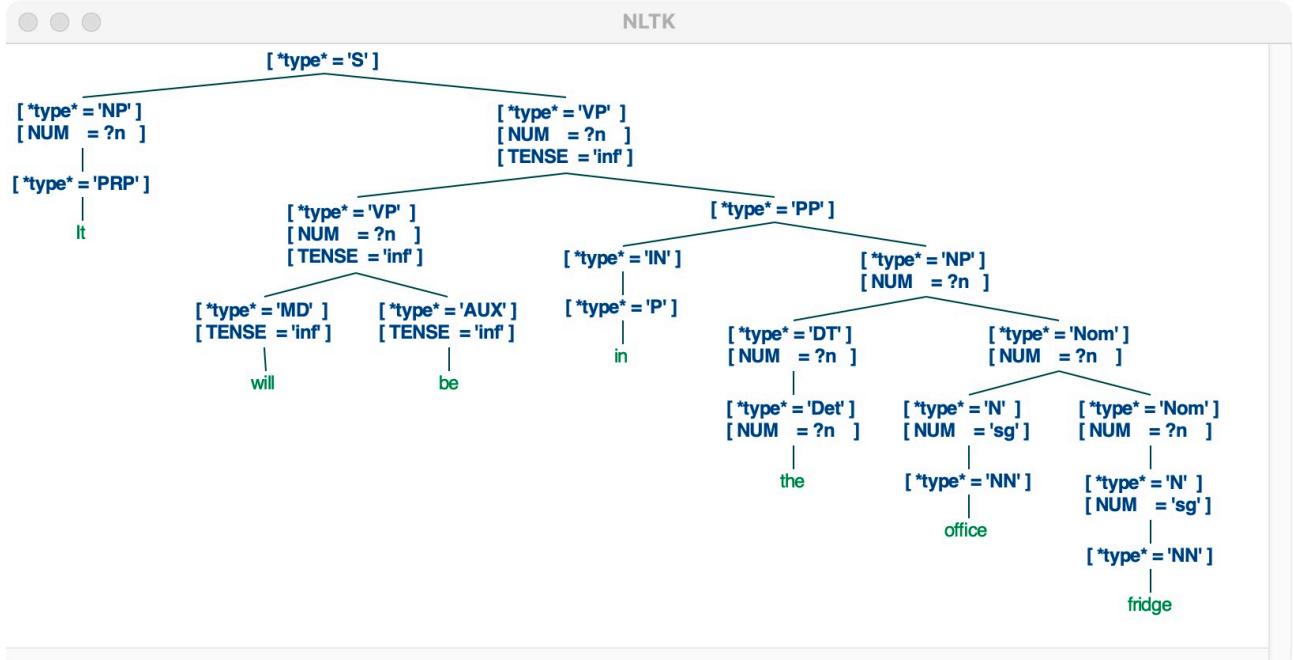


Figure 45. Challenge File 6 result: ‘It will be in the office fridge’.