

Your own grammar rules for <s> with #getEword# and #gen# inserted is due to me on/before Week15M by Dec 7.

<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#] <noun> #getEword# SUBJECT
#gen(ACTOR)# <after subject>
<after subject> ::= <verb> > #gen(ACTION)# <tense> #gen(TENSE)# PEROD | <noun> #getEword# <after noun>.....

This part of the project helps you learn how semantic routines are called in compilers.

Semantic routines are called from the parser to do

- Semantic error checks
- Translation (or target code generation)

For programming languages, semantic error checks include

- The variable has been declared?
- Do the operand types match?

But for this project, we will not do semantic error checks.

We will, however, do translation.

**First, make a copy of your parser so that you won't lose the working parser.
Do not remove the parser trace messages.**

Updated Grammar Rules and the Translation Results

Your program will be producing internal representations of sentences.

The Internal Rep (IR) and updated grammar rules that include calls to semantic routines for the 5 cases of <s> are as follows.

Please note that #'s are used to indicate names of semantic routines.

e.g.

<a> ::= #xyz# <c> means

In a, call b, call the semantic routine xyz, and then call c.

Your own grammar rules for <s> with #getEword# and #gen# inserted is due to me on/before Week15M. You must get it approved by me to start coding. Otherwise, your project will not be accepted!!!! See the file Project-partCon-updated-rules.

For <s> Case 1:

```
<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#]  
      <noun> #getEword# SUBJECT #gen(ACTOR)#  
      <verb> #getEword# #gen(ACTION)#  
      <tense> #gen("TENSE")#  
      PERIOD
```

In the following IRs, *italics* is used for description of actual values while Upper Case letters are used for scanner token types of tense reserved words.

IR to be produced is:

CONNECTOR:	<i>saved_E_word</i>
ACTOR:	<i>saved_E_word</i>
ACTION:	<i>saved_E_word</i>
TENSE:	VERB or VERBNEG or VERBPAST or VERBPASTNEG

e.g. for "rika wa *nakl masen*" (there is no connector)

ACTOR:	rika
ACTION:	cry
TENSE:	VERBNEG

For <s> Case2:

```
<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#]  
      <noun> #getEword# SUBJECT #gen(ACTOR)#  
      <noun> #getEword#  
      <be> #gen(DESCRIPTION)# #gen(TENSE)#  
      PERIOD
```

IR to be produced is:

CONNECTOR:	<i>saved_E_word</i>
ACTOR:	<i>saved_E_word</i>
DESCRIPTION:	<i>saved_E_word</i>
TENSE:	IS or WAS

e.g. for "rika wa *shiawase desu*" (there is no connector)

ACTOR:	rika
DESCRIPTION:	shiawase
TENSE:	IS

e.g. for "dakara watashi wa kanashii deshita" (there is a connector)

CONNECTOR:	Therefore
ACTOR:	I/me
DESCRIPTION:	sad
TENSE:	WAS

For <s> Case 3:

```
<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#]
        <noun> #getEword# SUBJECT #gen(ACTOR)#
        <noun> #getEword# DESTINATION #gen(TO)#
        <verb> #getEword# #gen(ACTION)#
        <tense> #gen(TENSE)# PERIOD
```

IR to be produced is:

CONNECTOR:	<i>saved_E_word</i>
ACTOR:	<i>saved_E_word</i>
TO:	<i>saved_E_word</i>
ACTION:	<i>saved_E_word</i>
TENSE:	VERB or VERBNEG or VERBPAST or VERBPASTNEG

e.g. for "rika wa kurasu ni iki masu"

ACTOR:	rika
TO:	kurasu
ACTION:	iki
TENSE:	VERB

For <s> Case 4:

```
<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#]
        <noun> #getEword# SUBJECT #gen(ACTOR)#
        <noun> #getEword# OBJECT #gen(OBJECT)#
        <verb> #getEword# #gen(ACTION)#
        <tense> #gen(TENSE)#
        PERIOD
```

IR to be produced is:

CONNECTOR:	<i>saved_E_word</i>
ACTOR:	<i>saved_E_word</i>
OBJECT:	<i>saved_E_word</i>
ACTION:	<i>saved_E_word</i>
TENSE:	VERB or VERBNEG or VERBPAST or VERBPASTNEG

e.g. for "rika wa ringo o tabE mashita"

ACTOR: rika
OBJECT: ringo
ACTION: eat
TENSE: VERBPAST

For <s> Case 5:

<s> ::= [CONNECTOR #getEword# #gen(CONNECTOR)#]
 <noun> #getEword# SUBJECT #gen(ACTOR)#
 <noun> #getEword# OBJECT #gen(OBJECT)#
 <noun> #getEword# DESTINATION #gen(TO)#
 <verb> #getEword# #gen(ACTION)#
 <tense> #gen(TENSE)#
 PERIOD

IR to be produced is:

CONNECTOR: saved_E_word
ACTOR: saved_E_word
OBJECT: saved_E_word
TO: saved_E_word
ACTION: saved_E_word
TENSE: VERB or VERBNEG or VERBPAST or VERBPASTNEG

e.g. for "shikashi watashi wa okane o kare ni agE masendeshita"

CONNECTOR: However
ACTOR: I/me
OBJECT: okane
TO: he/him
ACTION: agE
TENSE: VERBPASTNEG

NOTE:

- 1) Notice that some parts of the Internal Representations are still in Japanese. This is because your dictionary is incomplete. That's fine.
- 2) We are NOT writing the generator which transforms the above Internal Representations into actual English sentences. That would be a separate program.

[Setting up the Dictionary:](#)

First, you need to declare a data structure for the Dictionary and read in the contents of my **lexicon.txt**.

How #getEword# obtains English Words from the Lexicon/Dictionary:

For each entry in the Internal Representation of a sentence,
either a Japanese word or its English equivalent must be displayed.

To do this we will use **#getEword#**.

- **As you see in the above examples, #getEword# is called right after CONNECTOR, or <noun> or <verb>.**
- Using **saved_lexeme** (the current word from the scanner), it looks up the Lexicon/Dictionary.
- **Whatever #getEword# retrieves will be saved in saved_E_word and then be later used by #gen#**

If the word is in the Lexicon/Dictionary, save the English word in **saved_E_word**..

But if the word is not in the Lexicon/Dictionary, just save the Japanese word in **saved_E_word**.

How to produce IR with #gen#

In the grammar rules above,

**#gen# marks the places in <s> where
generation of a line of the Internal Representation has to occur.**

e.g. **ACTOR:** rika

The output from #gen# should go to the file **translated.txt**.

Make sure this file is new each time you use the parser.

For all lines except for TENSE:, saved_E_word is generated. Otherwise, saved_token is generated:

After CONNECTOR is seen,

#gen# generates the **CONNECTOR:** line

Right after SUBJECT is seen,

#gen# generates the **ACTOR:** line

Right after <be>,

#gen# generates the **DESCRIPTION:** line

#gen# generates the **TENSE:** line

Right after OBJECT is seen,

#gen# generates the **OBJECT:** line

Right after DESTINATION is seen,

#gen# generates the **TO:** line

After <verb> is seen,

#gen# generates the **ACTION:** line

Right after <tense> is seen,

#gen# generates the **TENSE:** line

Note that #gen# has to be passed what kind of line it is to generate

e.g. gen("CONNECTOR").

Given the kind of line and the saved_E_word or saved_token a line can be generated.

Required Comments: @@@@

You must update the parser comments with updated grammar rules which clearly show where #getEword# and #gen# are called.

Required Testing:

You must test with the 6 test cases again. The correct IR for test 1 is available. (Test 7 for EC).

Must Divide the Work as follows:

- **Member A:** write getEword
- **Member B:** write gen
- **Member C:** set up and read in the dictionary content.

Then everyone should update the parser routine with the semantic routine calls.

Everyone must come to a meeting to put everything together (the code, the report, and the check list) and make the code bug free. You will get to again report who did the tasks in projectWork.txt.

What to Submit by Week16 Thursday Dec 17:

- The **executable** should be **submitted** as group#project.out.
- projectWork.txt should be **submitted** including the requested info.

If not submitted, your project report will not be accepted!

Read **What to Submit** for the project report requirements.

```
<story> ::= <s> { <s> }
<s> ::= [CONNECTOR] <noun> SUBJECT <afterSubject>
<afterSubject> ::= <verb> <tense> PERIOD | <noun> <afterNoun>
<afterNoun> ::= <be> PERIOD | DESTINATION <verb> <tense> PERIOD | OBJECT <afterObject>
<afterObject> ::= <verb> <tense> PERIOD | <noun> DESTINATION <verb> <tense> PERIOD
<noun> ::= WORD1 | PRONOUN
<verb> ::= WORD2
<be> ::= IS | WAS
<tense> ::= VERBPAST | VERBPASTNEG | VERB | VERBNEG
```

Everything in uppercase is a reserved word from Part A (table), the scanner

There are 5 PRONOUNS and 4 CONNECTOR

[lkrell@empress TranslatorFiles]\$ more lexicon.txt

watashi I/me
anata you
kare he/him
kanojo she/her
sore it

mata Also
soshite Then
shikashi However
dakara Therefore

daigaku college
kurasu class
hon book
tesuto test
ie home
isu chair
seito student
sensei teacher
tomodachi friend
jidoosha car
gyuunyuu milk
biiru beer
choucho butterfly
ryouri cooking
toire restroom
gohan meal

yasashii easy
muzukashii difficult
ureshii pleased
shiwase happy
kanashii sad
omoi heavy
oishii delicious
tennen natural

nakl cry
ikl go
tabE eat
ukE take
kakl write
yoml read
noml drink
agE give
moral receive
butsl hit

kerl kick
shaberl talk
yarl do
yorokobl enjoy