# 19MAI0017 Chunking of LOR 1

```python
import nltk
doc1 = """I am pleased to recommend MrXX for an MS in Computer Science
 at your esteemed university. I have known him since his second year. H
e was my student in the 3rd semester (2nd year), where I taught him the
 course of Database Management Systems.
I first got to know X in the course of Database Management Systems, CSE
-2004. In the first week of the course, I was surprised to know that X,
 an Electronics and Instrumentation student, had taken up a computer sc
ience core course. Initially I was doubtful about a non-CS student's ap
proach and grasp of the subject, but he adapted to it as naturally as a
 fish to water. By the time the course came to an end, he had proved hi
s mettle.
I observed that X had a keen interest and was fully involved in the cou
rse when I saw his performances during the Lab sessions, where he would
 be able to grasp new concepts such as query formation and joins. He ha
s been highly active in the technical scene of our college too with him
 organizing many events.
As a part of the course, students are required to develop a project, wi
th a fully functional Database System consisting of the concepts learnt
 throughout the semester. Despite X not being from a computer science b
ackground, his project did not languish. He went above and beyond to ma
ke a professional database design, which included an 'Auto-Increment' f
eature using a PL/SQL sequence written by him, bulk insertion into the
 table and other features.
I was pleased to know that he applied the concepts in his internship ex
tensively to build a professional tool for Intellect Design Arena. He d
esigned this tool to make the process of configuring a Logical Data Mod
el easier and much faster. It consisted of a User Interface (UI) that c
an replicate back-end tasks such as inserting data in a database at the
 click of a button. His task was cut out for him as the tool was being
 built for J.P. Morgan Chase as a client and hence there was no room fo
r error. I am proud to say that the tool, which he built over a course
```

```
 of two months, was pushed to production at the end of his internship.
X makes a strong candidate for your Master's program majoring in Comput
er Science. His proposed candidature has my endorsement without any res
ervations whatsoever.
"""
```

In [2]: 
```python
token = nltk.word_tokenize(doc1) #tokenize the words
```

In [3]: 
```python
postags = nltk.pos_tag(token) #do pos tagging of the doc
print(postags)
```

```
[('I', 'PRP'), ('am', 'VBP'), ('pleased', 'JJ'), ('to', 'TO'), ('recomm
end', 'VB'), ('MrXX', 'NNP'), ('for', 'IN'), ('an', 'DT'), ('MS', 'NN
P'), ('in', 'IN'), ('Computer', 'NNP'), ('Science', 'NNP'), ('at', 'I
N'), ('your', 'PRP$'), ('esteemed', 'JJ'), ('university', 'NN'), ('.',
'.'), ('I', 'PRP'), ('have', 'VBP'), ('known', 'VBN'), ('him', 'PRP'),
('since', 'IN'), ('his', 'PRP$'), ('second', 'JJ'), ('year', 'NN'),
('.', '.'), ('He', 'PRP'), ('was', 'VBD'), ('my', 'PRP$'), ('student',
'NN'), ('in', 'IN'), ('the', 'DT'), ('3rd', 'CD'), ('semester', 'NN'),
('(', '('), ('2nd', 'CD'), ('year', 'NN'), (')', ')'), (',', ','), ('wh
ere', 'WRB'), ('I', 'PRP'), ('taught', 'VBD'), ('him', 'PRP'), ('the',
'DT'), ('course', 'NN'), ('of', 'IN'), ('Database', 'NNP'), ('Managemen
t', 'NNP'), ('Systems', 'NNPS'), ('.', '.'), ('I', 'PRP'), ('first', 'R
B'), ('got', 'VBD'), ('to', 'TO'), ('know', 'VB'), ('X', 'NNP'), ('in',
'IN'), ('the', 'DT'), ('course', 'NN'), ('of', 'IN'), ('Database', 'NN
P'), ('Management', 'NNP'), ('Systems', 'NNPS'), (',', ','), ('CSE-200
4', 'NNP'), ('.', '.'), ('In', 'IN'), ('the', 'DT'), ('first', 'JJ'),
('week', 'NN'), ('of', 'IN'), ('the', 'DT'), ('course', 'NN'), (',',
','), ('I', 'PRP'), ('was', 'VBD'), ('surprised', 'VBN'), ('to', 'TO'),
('know', 'VB'), ('that', 'DT'), ('X', 'NNP'), (',', ','), ('an', 'DT'),
('Electronics', 'NNS'), ('and', 'CC'), ('Instrumentation', 'NNP'), ('st
udent', 'NN'), (',', ','), ('had', 'VBD'), ('taken', 'VBN'), ('up', 'R
P'), ('a', 'DT'), ('computer', 'NN'), ('science', 'NN'), ('core', 'N
N'), ('course', 'NN'), ('.', '.'), ('Initially', 'NNP'), ('I', 'PRP'),
('was', 'VBD'), ('doubtful', 'JJ'), ('about', 'IN'), ('a', 'DT'), ('non
-CS', 'JJ'), ('student', 'NN'), (''', 'NNP'), ('s', 'NN'), ('approach',
'NN'), ('and', 'CC'), ('grasp', 'NN'), ('of', 'IN'), ('the', 'DT'), ('s
ubject', 'NN'), (',', ','), ('but', 'CC'), ('he', 'PRP'), ('adapted',
'VBD'), ('to', 'TO'), ('it', 'PRP'), ('as', 'RB'), ('naturally', 'RB'),
```

('as', 'IN'), ('a', 'DT'), ('fish', 'NN'), ('to', 'TO'), ('water', 'NN'), ('.', '.'), ('By', 'IN'), ('the', 'DT'), ('time', 'NN'), ('the', 'DT'), ('course', 'NN'), ('came', 'VBD'), ('to', 'TO'), ('an', 'DT'), ('end', 'NN'), (',', ','), ('he', 'PRP'), ('had', 'VBD'), ('proved', 'VBN'), ('his', 'PRP$'), ('mettle', 'NN'), ('.', '.'), ('I', 'PRP'), ('observed', 'VBD'), ('that', 'IN'), ('X', 'NNP'), ('had', 'VBD'), ('a', 'DT'), ('keen', 'JJ'), ('interest', 'NN'), ('and', 'CC'), ('was', 'VBD'), ('fully', 'RB'), ('involved', 'VBN'), ('in', 'IN'), ('the', 'DT'), ('course', 'NN'), ('when', 'WRB'), ('I', 'PRP'), ('saw', 'VBD'), ('his', 'PRP$'), ('performances', 'NNS'), ('during', 'IN'), ('the', 'DT'), ('Lab', 'NNP'), ('sessions', 'NNS'), (',', ','), ('where', 'WRB'), ('he', 'PRP'), ('would', 'MD'), ('be', 'VB'), ('able', 'JJ'), ('to', 'TO'), ('grasp', 'VB'), ('new', 'JJ'), ('concepts', 'NNS'), ('such', 'JJ'), ('as', 'IN'), ('query', 'NN'), ('formation', 'NN'), ('and', 'CC'), ('joins', 'NNS'), ('.', '.'), ('He', 'PRP'), ('has', 'VBZ'), ('been', 'VBN'), ('highly', 'RB'), ('active', 'JJ'), ('in', 'IN'), ('the', 'DT'), ('technical', 'JJ'), ('scene', 'NN'), ('of', 'IN'), ('our', 'PRP$'), ('college', 'NN'), ('too', 'RB'), ('with', 'IN'), ('him', 'PRP'), ('organizing', 'VBG'), ('many', 'JJ'), ('events', 'NNS'), ('.', '.'), ('As', 'IN'), ('a', 'DT'), ('part', 'NN'), ('of', 'IN'), ('the', 'DT'), ('course', 'NN'), (',', ','), ('students', 'NNS'), ('are', 'VBP'), ('required', 'VBN'), ('to', 'TO'), ('develop', 'VB'), ('a', 'DT'), ('project', 'NN'), (',', ','), ('with', 'IN'), ('a', 'DT'), ('fully', 'RB'), ('functional', 'JJ'), ('Database', 'NNP'), ('System', 'NNP'), ('consisting', 'VBG'), ('of', 'IN'), ('the', 'DT'), ('concepts', 'NNS'), ('learnt', 'VBP'), ('throughout', 'IN'), ('the', 'DT'), ('semester', 'NN'), ('.', '.'), ('Despite', 'IN'), ('X', 'NN'), ('not', 'RB'), ('being', 'VBG'), ('from', 'IN'), ('a', 'DT'), ('computer', 'NN'), ('science', 'NN'), ('background', 'NN'), (',', ','), ('his', 'PRP$'), ('project', 'NN'), ('did', 'VBD'), ('not', 'RB'), ('languish', 'VB'), ('.', '.'), ('He', 'PRP'), ('went', 'VBD'), ('above', 'IN'), ('and', 'CC'), ('beyond', 'IN'), ('to', 'TO'), ('make', 'VB'), ('a', 'DT'), ('professional', 'JJ'), ('database', 'NN'), ('design', 'NN'), (',', ','), ('which', 'WDT'), ('included', 'VBD'), ('an', 'DT'), ('‘', 'JJ'), ('Auto-Increment', 'JJ'), ('’', 'NN'), ('feature', 'NN'), ('using', 'VBG'), ('a', 'DT'), ('PL/SQL', 'NNP'), ('sequence', 'NN'), ('written', 'VBN'), ('by', 'IN'), ('him', 'PRP'), (',', ','), ('bulk', 'NN'), ('insertion', 'NN'), ('into', 'IN'), ('the', 'DT'), ('table', 'NN'), ('and', 'CC'), ('other', 'JJ'), ('features', 'NNS'), ('.', '.'), ('I', 'PRP'), ('was', 'VBD'), ('please

```
d', 'JJ'), ('to', 'TO'), ('know', 'VB'), ('that', 'IN'), ('he', 'PRP'),
('applied', 'VBD'), ('the', 'DT'), ('concepts', 'NNS'), ('in', 'IN'),
('his', 'PRP$'), ('internship', 'NN'), ('extensively', 'RB'), ('to', 'T
O'), ('build', 'VB'), ('a', 'DT'), ('professional', 'JJ'), ('tool', 'N
N'), ('for', 'IN'), ('Intellect', 'NNP'), ('Design', 'NNP'), ('Arena',
'NNP'), ('.', '.'), ('He', 'PRP'), ('designed', 'VBD'), ('this', 'DT'),
('tool', 'NN'), ('to', 'TO'), ('make', 'VB'), ('the', 'DT'), ('proces
s', 'NN'), ('of', 'IN'), ('configuring', 'VBG'), ('a', 'DT'), ('Logica
l', 'NNP'), ('Data', 'NNP'), ('Model', 'NNP'), ('easier', 'JJR'), ('an
d', 'CC'), ('much', 'JJ'), ('faster', 'JJR'), ('.', '.'), ('It', 'PR
P'), ('consisted', 'VBD'), ('of', 'IN'), ('a', 'DT'), ('User', 'NNP'),
('Interface', 'NNP'), ('(', '('), ('UI', 'NNP'), (')', ')'), ('that',
'WDT'), ('can', 'MD'), ('replicate', 'VB'), ('back-end', 'JJ'), ('task
s', 'NNS'), ('such', 'JJ'), ('as', 'IN'), ('inserting', 'VBG'), ('dat
a', 'NNS'), ('in', 'IN'), ('a', 'DT'), ('database', 'NN'), ('at', 'I
N'), ('the', 'DT'), ('click', 'NN'), ('of', 'IN'), ('a', 'DT'), ('butto
n', 'NN'), ('.', '.'), ('His', 'PRP$'), ('task', 'NN'), ('was', 'VBD'),
('cut', 'VBN'), ('out', 'RP'), ('for', 'IN'), ('him', 'PRP'), ('as', 'I
N'), ('the', 'DT'), ('tool', 'NN'), ('was', 'VBD'), ('being', 'VBG'),
('built', 'VBN'), ('for', 'IN'), ('J.P.', 'NNP'), ('Morgan', 'NNP'),
('Chase', 'NNP'), ('as', 'IN'), ('a', 'DT'), ('client', 'NN'), ('and',
'CC'), ('hence', 'NN'), ('there', 'EX'), ('was', 'VBD'), ('no', 'DT'),
('room', 'NN'), ('for', 'IN'), ('error', 'NN'), ('.', '.'), ('I', 'PR
P'), ('am', 'VBP'), ('proud', 'JJ'), ('to', 'TO'), ('say', 'VB'), ('tha
t', 'IN'), ('the', 'DT'), ('tool', 'NN'), (',', ','), ('which', 'WDT'),
('he', 'PRP'), ('built', 'VBD'), ('over', 'RP'), ('a', 'DT'), ('cours
e', 'NN'), ('of', 'IN'), ('two', 'CD'), ('months', 'NNS'), (',', ','),
('was', 'VBD'), ('pushed', 'VBN'), ('to', 'TO'), ('production', 'NN'),
('at', 'IN'), ('the', 'DT'), ('end', 'NN'), ('of', 'IN'), ('his', 'PRP
$'), ('internship', 'NN'), ('.', '.'), ('X', 'NNP'), ('makes', 'VBZ'),
('a', 'DT'), ('strong', 'JJ'), ('candidate', 'NN'), ('for', 'IN'), ('yo
ur', 'PRP$'), ('Master', 'NNP'), ("'s", 'POS'), ('program', 'NN'), ('ma
joring', 'NN'), ('in', 'IN'), ('Computer', 'NNP'), ('Science', 'NNP'),
('.', '.'), ('His', 'PRP$'), ('proposed', 'VBN'), ('candidature', 'N
N'), ('has', 'VBZ'), ('my', 'PRP$'), ('endorsement', 'NN'), ('without',
'IN'), ('any', 'DT'), ('reservations', 'NNS'), ('whatsoever', 'NN'),
('.', '.')]
```

In [4]: `grammar1 = "VP: {<RB.?>*<VB.?>*<NNP>+<NN>?}"`

```
cp1 = nltk.RegexpParser(grammar1) #RE is ready in Cp
```

In [5]: 
```
result = cp1.parse(postags) #entire doc is parsed through the filter
```

In [6]: 
```
print(result)
```

```
(S
  I/PRP
  am/VBP
  pleased/JJ
  to/TO
  (VP recommend/VB MrXX/NNP)
  for/IN
  an/DT
  (VP MS/NNP)
  in/IN
  (VP Computer/NNP Science/NNP)
  at/IN
  your/PRP$
  esteemed/JJ
  university/NN
  ./.
  I/PRP
  have/VBP
  known/VBN
  him/PRP
  since/IN
  his/PRP$
  second/JJ
  year/NN
  ./.
  He/PRP
  was/VBD
  my/PRP$
  student/NN
  in/IN
  the/DT
  3rd/CD
  semester/NN
```

```
(/(
2nd/CD
year/NN
)/)
,/,
where/WRB
I/PRP
taught/VBD
him/PRP
the/DT
course/NN
of/IN
(VP Database/NNP Management/NNP)
Systems/NNPS
./.
I/PRP
first/RB
got/VBD
to/TO
(VP know/VB X/NNP)
in/IN
the/DT
course/NN
of/IN
(VP Database/NNP Management/NNP)
Systems/NNPS
,/,
(VP CSE-2004/NNP)
./.
In/IN
the/DT
first/JJ
week/NN
of/IN
the/DT
course/NN
,/,
I/PRP
was/VBD
```

```
surprised/VBN
to/TO
know/VB
that/DT
(VP X/NNP)
,/,
an/DT
Electronics/NNS
and/CC
(VP Instrumentation/NNP student/NN)
,/,
had/VBD
taken/VBN
up/RP
a/DT
computer/NN
science/NN
core/NN
course/NN
./.
(VP Initially/NNP)
I/PRP
was/VBD
doubtful/JJ
about/IN
a/DT
non-CS/JJ
student/NN
(VP '/NNP s/NN)
approach/NN
and/CC
grasp/NN
of/IN
the/DT
subject/NN
,/,
but/CC
he/PRP
adapted/VBD
```

to/TO
it/PRP
as/RB
naturally/RB
as/IN
a/DT
fish/NN
to/TO
water/NN
./.
By/IN
the/DT
time/NN
the/DT
course/NN
came/VBD
to/TO
an/DT
end/NN
,/,
he/PRP
had/VBD
proved/VBN
his/PRP$
mettle/NN
./.
I/PRP
observed/VBD
that/IN
(VP X/NNP)
had/VBD
a/DT
keen/JJ
interest/NN
and/CC
was/VBD
fully/RB
involved/VBN
in/IN

the/DT
course/NN
when/WRB
I/PRP
saw/VBD
his/PRP$
performances/NNS
during/IN
the/DT
(VP Lab/NNP)
sessions/NNS
,/,
where/WRB
he/PRP
would/MD
be/VB
able/JJ
to/TO
grasp/VB
new/JJ
concepts/NNS
such/JJ
as/IN
query/NN
formation/NN
and/CC
joins/NNS
./.
He/PRP
has/VBZ
been/VBN
highly/RB
active/JJ
in/IN
the/DT
technical/JJ
scene/NN
of/IN
our/PRP$

```
college/NN
too/RB
with/IN
him/PRP
organizing/VBG
many/JJ
events/NNS
./.
As/IN
a/DT
part/NN
of/IN
the/DT
course/NN
,/,
students/NNS
are/VBP
required/VBN
to/TO
develop/VB
a/DT
project/NN
,/,
with/IN
a/DT
fully/RB
functional/JJ
(VP Database/NNP System/NNP)
consisting/VBG
of/IN
the/DT
concepts/NNS
learnt/VBP
throughout/IN
the/DT
semester/NN
./.
Despite/IN
X/NN
```

```
not/RB
being/VBG
from/IN
a/DT
computer/NN
science/NN
background/NN
,/,
his/PRP$
project/NN
did/VBD
not/RB
languish/VB
./.
He/PRP
went/VBD
above/IN
and/CC
beyond/IN
to/TO
make/VB
a/DT
professional/JJ
database/NN
design/NN
,/,
which/WDT
included/VBD
an/DT
'/JJ
Auto-Increment/JJ
'/NN
feature/NN
using/VBG
a/DT
(VP PL/SQL/NNP sequence/NN)
written/VBN
by/IN
him/PRP
```

```
,/,
bulk/NN
insertion/NN
into/IN
the/DT
table/NN
and/CC
other/JJ
features/NNS
./.
I/PRP
was/VBD
pleased/JJ
to/TO
know/VB
that/IN
he/PRP
applied/VBD
the/DT
concepts/NNS
in/IN
his/PRP$
internship/NN
extensively/RB
to/TO
build/VB
a/DT
professional/JJ
tool/NN
for/IN
(VP Intellect/NNP Design/NNP Arena/NNP)
./.
He/PRP
designed/VBD
this/DT
tool/NN
to/TO
make/VB
the/DT
```

```
process/NN
of/IN
configuring/VBG
a/DT
(VP Logical/NNP Data/NNP Model/NNP)
easier/JJR
and/CC
much/JJ
faster/JJR
./.
It/PRP
consisted/VBD
of/IN
a/DT
(VP User/NNP Interface/NNP)
(/(
(VP UI/NNP)
)/)
that/WDT
can/MD
replicate/VB
back-end/JJ
tasks/NNS
such/JJ
as/IN
inserting/VBG
data/NNS
in/IN
a/DT
database/NN
at/IN
the/DT
click/NN
of/IN
a/DT
button/NN
./.
His/PRP$
task/NN
```

```
was/VBD
cut/VBN
out/RP
for/IN
him/PRP
as/IN
the/DT
tool/NN
was/VBD
being/VBG
built/VBN
for/IN
(VP J.P./NNP Morgan/NNP Chase/NNP)
as/IN
a/DT
client/NN
and/CC
hence/NN
there/EX
was/VBD
no/DT
room/NN
for/IN
error/NN
./.
I/PRP
am/VBP
proud/JJ
to/TO
say/VB
that/IN
the/DT
tool/NN
,/,
which/WDT
he/PRP
built/VBD
over/RP
a/DT
```

```
course/NN
of/IN
two/CD
months/NNS
,/,
was/VBD
pushed/VBN
to/TO
production/NN
at/IN
the/DT
end/NN
of/IN
his/PRP$
internship/NN
./.
(VP X/NNP)
makes/VBZ
a/DT
strong/JJ
candidate/NN
for/IN
your/PRP$
(VP Master/NNP)
's/POS
program/NN
majoring/NN
in/IN
(VP Computer/NNP Science/NNP)
./.
His/PRP$
proposed/VBN
candidature/NN
has/VBZ
my/PRP$
endorsement/NN
without/IN
any/DT
reservations/NNS
```

```
    whatsoever/NN
    ./.)
```

In [7]: ```python
result.draw()
```

In [8]: ```python
chunks1 = nltk.ne_chunk(postags) #chunking the tagged sentence
```

In [9]: ```python
print(chunks1)
```

```
(S
  I/PRP
  am/VBP
  pleased/JJ
  to/TO
  recommend/VB
  (ORGANIZATION MrXX/NNP)
  for/IN
  an/DT
  MS/NNP
  in/IN
  (ORGANIZATION Computer/NNP Science/NNP)
  at/IN
  your/PRP$
  esteemed/JJ
  university/NN
  ./.
  I/PRP
  have/VBP
  known/VBN
  him/PRP
  since/IN
  his/PRP$
  second/JJ
  year/NN
  ./.
  He/PRP
  was/VBD
  my/PRP$
```

```
student/NN
in/IN
the/DT
3rd/CD
semester/NN
(/(
2nd/CD
year/NN
)/)
,/,
where/WRB
I/PRP
taught/VBD
him/PRP
the/DT
course/NN
of/IN
(ORGANIZATION Database/NNP Management/NNP Systems/NNPS)
./.
I/PRP
first/RB
got/VBD
to/TO
know/VB
X/NNP
in/IN
the/DT
course/NN
of/IN
(ORGANIZATION Database/NNP Management/NNP Systems/NNPS)
,/,
CSE-2004/NNP
./.
In/IN
the/DT
first/JJ
week/NN
of/IN
the/DT
```

```
course/NN
,/,
I/PRP
was/VBD
surprised/VBN
to/TO
know/VB
that/DT
X/NNP
,/,
an/DT
Electronics/NNS
and/CC
Instrumentation/NNP
student/NN
,/,
had/VBD
taken/VBN
up/RP
a/DT
computer/NN
science/NN
core/NN
course/NN
./.
Initially/NNP
I/PRP
was/VBD
doubtful/JJ
about/IN
a/DT
non-CS/JJ
student/NN
'/NNP
s/NN
approach/NN
and/CC
grasp/NN
of/IN
```

```
the/DT
subject/NN
,/,
but/CC
he/PRP
adapted/VBD
to/TO
it/PRP
as/RB
naturally/RB
as/IN
a/DT
fish/NN
to/TO
water/NN
./.
By/IN
the/DT
time/NN
the/DT
course/NN
came/VBD
to/TO
an/DT
end/NN
,/,
he/PRP
had/VBD
proved/VBN
his/PRP$
mettle/NN
./.
I/PRP
observed/VBD
that/IN
(PERSON X/NNP)
had/VBD
a/DT
keen/JJ
```

```
interest/NN
and/CC
was/VBD
fully/RB
involved/VBN
in/IN
the/DT
course/NN
when/WRB
I/PRP
saw/VBD
his/PRP$
performances/NNS
during/IN
the/DT
(ORGANIZATION Lab/NNP)
sessions/NNS
,/,
where/WRB
he/PRP
would/MD
be/VB
able/JJ
to/TO
grasp/VB
new/JJ
concepts/NNS
such/JJ
as/IN
query/NN
formation/NN
and/CC
joins/NNS
./.
He/PRP
has/VBZ
been/VBN
highly/RB
active/JJ
```

```
in/IN
the/DT
technical/JJ
scene/NN
of/IN
our/PRP$
college/NN
too/RB
with/IN
him/PRP
organizing/VBG
many/JJ
events/NNS
./.
As/IN
a/DT
part/NN
of/IN
the/DT
course/NN
,/,
students/NNS
are/VBP
required/VBN
to/TO
develop/VB
a/DT
project/NN
,/,
with/IN
a/DT
fully/RB
functional/JJ
(ORGANIZATION Database/NNP)
System/NNP
consisting/VBG
of/IN
the/DT
concepts/NNS
```

learnt/VBP
throughout/IN
the/DT
semester/NN
./.
Despite/IN
X/NN
not/RB
being/VBG
from/IN
a/DT
computer/NN
science/NN
background/NN
,/,
his/PRP$
project/NN
did/VBD
not/RB
languish/VB
./.
He/PRP
went/VBD
above/IN
and/CC
beyond/IN
to/TO
make/VB
a/DT
professional/JJ
database/NN
design/NN
,/,
which/WDT
included/VBD
an/DT
'/JJ
Auto-Increment/JJ
'/NN

```
feature/NN
using/VBG
a/DT
PL/SQL/NNP
sequence/NN
written/VBN
by/IN
him/PRP
,/,
bulk/NN
insertion/NN
into/IN
the/DT
table/NN
and/CC
other/JJ
features/NNS
./.
I/PRP
was/VBD
pleased/JJ
to/TO
know/VB
that/IN
he/PRP
applied/VBD
the/DT
concepts/NNS
in/IN
his/PRP$
internship/NN
extensively/RB
to/TO
build/VB
a/DT
professional/JJ
tool/NN
for/IN
(ORGANIZATION Intellect/NNP)
```

```
Design/NNP
Arena/NNP
./.
He/PRP
designed/VBD
this/DT
tool/NN
to/TO
make/VB
the/DT
process/NN
of/IN
configuring/VBG
a/DT
(ORGANIZATION Logical/NNP Data/NNP Model/NNP)
easier/JJR
and/CC
much/JJ
faster/JJR
./.
It/PRP
consisted/VBD
of/IN
a/DT
(ORGANIZATION User/NNP)
Interface/NNP
(/(
UI/NNP
)/)
that/WDT
can/MD
replicate/VB
back-end/JJ
tasks/NNS
such/JJ
as/IN
inserting/VBG
data/NNS
in/IN
```

```
a/DT
database/NN
at/IN
the/DT
click/NN
of/IN
a/DT
button/NN
./.
His/PRP$
task/NN
was/VBD
cut/VBN
out/RP
for/IN
him/PRP
as/IN
the/DT
tool/NN
was/VBD
being/VBG
built/VBN
for/IN
(ORGANIZATION J.P./NNP Morgan/NNP)
Chase/NNP
as/IN
a/DT
client/NN
and/CC
hence/NN
there/EX
was/VBD
no/DT
room/NN
for/IN
error/NN
./.
I/PRP
am/VBP
```

```
proud/JJ
to/TO
say/VB
that/IN
the/DT
tool/NN
,/,
which/WDT
he/PRP
built/VBD
over/RP
a/DT
course/NN
of/IN
two/CD
months/NNS
,/,
was/VBD
pushed/VBN
to/TO
production/NN
at/IN
the/DT
end/NN
of/IN
his/PRP$
internship/NN
./.
X/NNP
makes/VBZ
a/DT
strong/JJ
candidate/NN
for/IN
your/PRP$
(PERSON Master/NNP)
's/POS
program/NN
majoring/NN
```

```
        in/IN
        (ORGANIZATION Computer/NNP Science/NNP)
        ./.
        His/PRP$
        proposed/VBN
        candidature/NN
        has/VBZ
        my/PRP$
        endorsement/NN
        without/IN
        any/DT
        reservations/NNS
        whatsoever/NN
        ./.)
```

In [10]: `chunks1.draw()`

In [11]:
```
#NER
#With the function nltk.ne_chunk(), we can recognize named entities usi
ng a classifier,
#the classifier adds category labels such as PERSON, ORGANIZATION, and
 GPE.
```

## Chunking of LOR 2

In [12]:
```
doc2 = """I am happy to write this letter of recommendation for AAA who
 intends to pursue a Master's degree at your prestigious university. I
 have known him only for the past year and it was easy to observe that
 he is a quick learner and hardworking. I handled the course Natural La
nguage Processing for him during his sixth semester.
He has also displayed his dedication and willingness to learn on numero
us occasions. On top of this, he is also very efficient in completing a
ny task that is given to him, never one to complain irrespective of any
 circumstances. I remember him submitting NLP weekly tasks well ahead o
f the specified time period. Among the several tasks that were given fr
om time to time, including stop word removal, stemming, synsets, tweet
```

tokenizer, working with porter stemmer, snowball stemmer and lancaster stemmer, word lemmatizer, count vectorizer and cosine similarity, a few of them were quite challenging. One, in particular, training and testing gender-based feature sets which he had a lot of trouble understanding. However, along with my help and a few of his friends, he ultimately got the job done. Another quality that caught my attention during my several interactions with him is that he is very percipient. He tends to relate everything that is taught in class to real-time situations. There was this one instance when the topic of n-gram linguistic models came up, he was very quick to point out that this forms the basis for numerous real-world applications such as spell check and autocomplete. He is also a keen observer often pointing out the mistakes even in his work.
During the time that I have known him, he had encountered various challenges which he had addressed through his well-directed efforts. I also learnt that he is capable of thinking out of the box as was the case when he started putting forth his ideas for his project. After quite a few briefings, he decided to choose the topic "Understanding word to vectors". He had initially considered the TF-IDF scores concerning different input documents or statements, after which he took the time to produce the word embeddings for each document CBOW models.
Apart from his technical skills, his talent for writing and documentation were also quite evident when I had a look at his project report. The diversity in his repertoire is what struck me the most. Hence, I believe that AAA has the necessary set of skills and the perfect attitude to perform well in his master's programme. I am confident that he will become an important asset to your university. I have no qualms or reservations in recommending him for admission at your esteemed university. You may feel free to get in touch with me regarding any queries with respect to his recommendation.
"""
```

```
In [13]: tokens = nltk.word_tokenize(doc2) #tokenize the sentences
```

```
In [14]: pos_tags = nltk.pos_tag(tokens) #do tagging for tokenized sentences
         print(pos_tags)
```

```
[('I', 'PRP'), ('am', 'VBP'), ('happy', 'JJ'), ('to', 'TO'), ('write',
'VB'), ('this', 'DT'), ('letter', 'NN'), ('of', 'IN'), ('recommendatio
```

n', 'NN'), ('for', 'IN'), ('AAA', 'NNP'), ('who', 'WP'), ('intends', 'VBZ'), ('to', 'TO'), ('pursue', 'VB'), ('a', 'DT'), ('Master', 'NN'), ("'s", 'POS'), ('degree', 'NN'), ('at', 'IN'), ('your', 'PRP$'), ('prestigious', 'JJ'), ('university', 'NN'), ('.', '.'), ('I', 'PRP'), ('have', 'VBP'), ('known', 'VBN'), ('him', 'PRP'), ('only', 'RB'), ('for', 'IN'), ('the', 'DT'), ('past', 'JJ'), ('year', 'NN'), ('and', 'CC'), ('it', 'PRP'), ('was', 'VBD'), ('easy', 'JJ'), ('to', 'TO'), ('observe', 'VB'), ('that', 'IN'), ('he', 'PRP'), ('is', 'VBZ'), ('a', 'DT'), ('quick', 'JJ'), ('learner', 'NN'), ('and', 'CC'), ('hardworking', 'NN'), ('.', '.'), ('I', 'PRP'), ('handled', 'VBD'), ('the', 'DT'), ('course', 'NN'), ('Natural', 'NNP'), ('Language', 'NNP'), ('Processing', 'NNP'), ('for', 'IN'), ('him', 'PRP'), ('during', 'IN'), ('his', 'PRP$'), ('sixth', 'JJ'), ('semester', 'NN'), ('.', '.'), ('He', 'PRP'), ('has', 'VBZ'), ('also', 'RB'), ('displayed', 'VBN'), ('his', 'PRP$'), ('dedication', 'NN'), ('and', 'CC'), ('willingness', 'NN'), ('to', 'TO'), ('learn', 'VB'), ('on', 'IN'), ('numerous', 'JJ'), ('occasions', 'NNS'), ('.', '.'), ('On', 'IN'), ('top', 'NN'), ('of', 'IN'), ('this', 'DT'), (',', ','), ('he', 'PRP'), ('is', 'VBZ'), ('also', 'RB'), ('very', 'RB'), ('efficient', 'JJ'), ('in', 'IN'), ('completing', 'VBG'), ('any', 'DT'), ('task', 'NN'), ('that', 'WDT'), ('is', 'VBZ'), ('given', 'VBN'), ('to', 'TO'), ('him', 'PRP'), (',', ','), ('never', 'RB'), ('one', 'CD'), ('to', 'TO'), ('complain', 'VB'), ('irrespective', 'JJ'), ('of', 'IN'), ('any', 'DT'), ('circumstances', 'NNS'), ('.', '.'), ('I', 'PRP'), ('remember', 'VBP'), ('him', 'PRP'), ('submitting', 'VBG'), ('NLP', 'NNP'), ('weekly', 'JJ'), ('tasks', 'NNS'), ('well', 'RB'), ('ahead', 'RB'), ('of', 'IN'), ('the', 'DT'), ('specified', 'JJ'), ('time', 'NN'), ('period', 'NN'), ('.', '.'), ('Among', 'IN'), ('the', 'DT'), ('several', 'JJ'), ('tasks', 'NNS'), ('that', 'WDT'), ('were', 'VBD'), ('given', 'VBN'), ('from', 'IN'), ('time', 'NN'), ('to', 'TO'), ('time', 'NN'), (',', ','), ('including', 'VBG'), ('stop', 'JJ'), ('word', 'NN'), ('removal', 'NN'), (',', ','), ('stemming', 'VBG'), (',', ','), ('synsets', 'NNS'), (',', ','), ('tweet', 'NN'), ('tokenizer', 'NN'), (',', ','), ('working', 'VBG'), ('with', 'IN'), ('porter', 'JJ'), ('stemmer', 'NN'), (',', ','), ('snowball', 'VB'), ('stemmer', 'NN'), ('and', 'CC'), ('lancaster', 'NN'), ('stemmer', 'NN'), (',', ','), ('word', 'NN'), ('lemmatizer', 'NN'), (',', ','), ('count', 'NN'), ('vectorizer', 'NN'), ('and', 'CC'), ('cosine', 'NN'), ('similarity', 'NN'), (',', ','), ('a', 'DT'), ('few', 'JJ'), ('of', 'IN'), ('them', 'PRP'), ('were', 'VBD'), ('quite', 'RB'), ('challenging', 'VBG'), ('.', '.'), ('On

e', 'CD'), (',', ','), ('in', 'IN'), ('particular', 'JJ'), (',', ','),
('training', 'NN'), ('and', 'CC'), ('testing', 'VBG'), ('gender-based',
'JJ'), ('feature', 'NN'), ('sets', 'NNS'), ('which', 'WDT'), ('he', 'PR
P'), ('had', 'VBD'), ('a', 'DT'), ('lot', 'NN'), ('of', 'IN'), ('troubl
e', 'NN'), ('understanding', 'NN'), ('.', '.'), ('However', 'RB'),
(',', ','), ('along', 'IN'), ('with', 'IN'), ('my', 'PRP$'), ('help',
'NN'), ('and', 'CC'), ('a', 'DT'), ('few', 'JJ'), ('of', 'IN'), ('his',
'PRP$'), ('friends', 'NNS'), (',', ','), ('he', 'PRP'), ('ultimately',
'RB'), ('got', 'VBD'), ('the', 'DT'), ('job', 'NN'), ('done', 'VBN'),
('.', '.'), ('Another', 'DT'), ('quality', 'NN'), ('that', 'WDT'), ('ca
ught', 'VBD'), ('my', 'PRP$'), ('attention', 'NN'), ('during', 'IN'),
('my', 'PRP$'), ('several', 'JJ'), ('interactions', 'NNS'), ('with', 'I
N'), ('him', 'PRP'), ('is', 'VBZ'), ('that', 'IN'), ('he', 'PRP'), ('i
s', 'VBZ'), ('very', 'RB'), ('percipient', 'JJ'), ('.', '.'), ('He', 'P
RP'), ('tends', 'VBZ'), ('to', 'TO'), ('relate', 'VB'), ('everything',
'NN'), ('that', 'WDT'), ('is', 'VBZ'), ('taught', 'VBN'), ('in', 'IN'),
('class', 'NN'), ('to', 'TO'), ('real-time', 'JJ'), ('situations', 'NN
S'), ('.', '.'), ('There', 'EX'), ('was', 'VBD'), ('this', 'DT'), ('on
e', 'CD'), ('instance', 'NN'), ('when', 'WRB'), ('the', 'DT'), ('topi
c', 'NN'), ('of', 'IN'), ('n-gram', 'JJ'), ('linguistic', 'JJ'), ('mode
ls', 'NNS'), ('came', 'VBD'), ('up', 'RB'), (',', ','), ('he', 'PRP'),
('was', 'VBD'), ('very', 'RB'), ('quick', 'JJ'), ('to', 'TO'), ('poin
t', 'VB'), ('out', 'RP'), ('that', 'IN'), ('this', 'DT'), ('forms', 'VB
Z'), ('the', 'DT'), ('basis', 'NN'), ('for', 'IN'), ('numerous', 'JJ'),
('real-world', 'JJ'), ('applications', 'NNS'), ('such', 'JJ'), ('as',
'IN'), ('spell', 'NN'), ('check', 'NN'), ('and', 'CC'), ('autocomplet
e', 'NN'), ('.', '.'), ('He', 'PRP'), ('is', 'VBZ'), ('also', 'RB'),
('a', 'DT'), ('keen', 'JJ'), ('observer', 'RB'), ('often', 'RB'), ('poi
nting', 'VBG'), ('out', 'RP'), ('the', 'DT'), ('mistakes', 'NNS'), ('ev
en', 'RB'), ('in', 'IN'), ('his', 'PRP$'), ('work', 'NN'), ('.', '.'),
('During', 'IN'), ('the', 'DT'), ('time', 'NN'), ('that', 'IN'), ('I',
'PRP'), ('have', 'VBP'), ('known', 'VBN'), ('him', 'PRP'), (',', ','),
('he', 'PRP'), ('had', 'VBD'), ('encountered', 'VBN'), ('various', 'J
J'), ('challenges', 'NNS'), ('which', 'WDT'), ('he', 'PRP'), ('had', 'V
BD'), ('addressed', 'VBN'), ('through', 'IN'), ('his', 'PRP$'), ('well-
directed', 'JJ'), ('efforts', 'NNS'), ('.', '.'), ('I', 'PRP'), ('als
o', 'RB'), ('learnt', 'VBP'), ('that', 'IN'), ('he', 'PRP'), ('is', 'VB
Z'), ('capable', 'JJ'), ('of', 'IN'), ('thinking', 'VBG'), ('out', 'I
N'), ('of', 'IN'), ('the', 'DT'), ('box', 'NN'), ('as', 'IN'), ('was',

'VBD'), ('the', 'DT'), ('case', 'NN'), ('when', 'WRB'), ('he', 'PRP'),
('started', 'VBD'), ('putting', 'VBG'), ('forth', 'NN'), ('his', 'PRP
$'), ('ideas', 'NNS'), ('for', 'IN'), ('his', 'PRP$'), ('project', 'N
N'), ('.', '.'), ('After', 'IN'), ('quite', 'RB'), ('a', 'DT'), ('few',
'JJ'), ('briefings', 'NNS'), (',', ','), ('he', 'PRP'), ('decided', 'VB
D'), ('to', 'TO'), ('choose', 'VB'), ('the', 'DT'), ('topic', 'NN'),
('``', '``'), ('Understanding', 'NNP'), ('word', 'NN'), ('to', 'TO'),
('vectors', 'NNS'), ("''", "''"), ('.', '.'), ('He', 'PRP'), ('had', 'V
BD'), ('initially', 'RB'), ('considered', 'VBN'), ('the', 'DT'), ('TF-I
DF', 'NNP'), ('scores', 'NNS'), ('concerning', 'VBG'), ('different', 'J
J'), ('input', 'NN'), ('documents', 'NNS'), ('or', 'CC'), ('statement
s', 'NNS'), (',', ','), ('after', 'IN'), ('which', 'WDT'), ('he', 'PR
P'), ('took', 'VBD'), ('the', 'DT'), ('time', 'NN'), ('to', 'TO'), ('pr
oduce', 'VB'), ('the', 'DT'), ('word', 'NN'), ('embeddings', 'NNS'),
('for', 'IN'), ('each', 'DT'), ('document', 'NN'), ('CBOW', 'NNP'), ('m
odels', 'NNS'), ('.', '.'), ('Apart', 'RB'), ('from', 'IN'), ('his', 'P
RP$'), ('technical', 'JJ'), ('skills', 'NNS'), (',', ','), ('his', 'PRP
$'), ('talent', 'NN'), ('for', 'IN'), ('writing', 'NN'), ('and', 'CC'),
('documentation', 'NN'), ('were', 'VBD'), ('also', 'RB'), ('quite', 'R
B'), ('evident', 'JJ'), ('when', 'WRB'), ('I', 'PRP'), ('had', 'VBD'),
('a', 'DT'), ('look', 'NN'), ('at', 'IN'), ('his', 'PRP$'), ('project',
'NN'), ('report', 'NN'), ('.', '.'), ('The', 'DT'), ('diversity', 'N
N'), ('in', 'IN'), ('his', 'PRP$'), ('repertoire', 'NN'), ('is', 'VB
Z'), ('what', 'WP'), ('struck', 'VBD'), ('me', 'PRP'), ('the', 'DT'),
('most', 'RBS'), ('.', '.'), ('Hence', 'NNP'), (',', ','), ('I', 'PR
P'), ('believe', 'VBP'), ('that', 'IN'), ('AAA', 'NNP'), ('has', 'VB
Z'), ('the', 'DT'), ('necessary', 'JJ'), ('set', 'NN'), ('of', 'IN'),
('skills', 'NNS'), ('and', 'CC'), ('the', 'DT'), ('perfect', 'JJ'), ('a
ttitude', 'NN'), ('to', 'TO'), ('perform', 'VB'), ('well', 'RB'), ('i
n', 'IN'), ('his', 'PRP$'), ('master', 'NN'), ("'", 'NNP'), ('s', 'N
N'), ('programme', 'NN'), ('.', '.'), ('I', 'PRP'), ('am', 'VBP'), ('co
nfident', 'JJ'), ('that', 'IN'), ('he', 'PRP'), ('will', 'MD'), ('becom
e', 'VB'), ('an', 'DT'), ('important', 'JJ'), ('asset', 'NN'), ('to',
'TO'), ('your', 'PRP$'), ('university', 'NN'), ('.', '.'), ('I', 'PR
P'), ('have', 'VBP'), ('no', 'DT'), ('qualms', 'NN'), ('or', 'CC'), ('r
eservations', 'NNS'), ('in', 'IN'), ('recommending', 'VBG'), ('him', 'P
RP'), ('for', 'IN'), ('admission', 'NN'), ('at', 'IN'), ('your', 'PRP
$'), ('esteemed', 'JJ'), ('university', 'NN'), ('.', '.'), ('You', 'PR
P'), ('may', 'MD'), ('feel', 'VB'), ('free', 'JJ'), ('to', 'TO'), ('ge

```
t', 'VB'), ('in', 'IN'), ('touch', 'NN'), ('with', 'IN'), ('me', 'PR
P'), ('regarding', 'VBG'), ('any', 'DT'), ('queries', 'NNS'), ('with',
'IN'), ('respect', 'NN'), ('to', 'TO'), ('his', 'PRP$'), ('recommendati
on', 'NN'), ('.', '.')]
```

In [15]:
```python
grammar2 = "NN: {<DT.?><JJ?><.NN.>}"
cp2 = nltk.RegexpParser(grammar2)
```

In [16]:
```python
result2 = cp2.parse(pos_tags)
```

In [17]:
```python
print(result2)
```

```
(S
  I/PRP
  am/VBP
  happy/JJ
  to/TO
  write/VB
  this/DT
  letter/NN
  of/IN
  recommendation/NN
  for/IN
  AAA/NNP
  who/WP
  intends/VBZ
  to/TO
  pursue/VB
  a/DT
  Master/NN
  's/POS
  degree/NN
  at/IN
  your/PRP$
  prestigious/JJ
  university/NN
  ./.
  I/PRP
```

have/VBP
known/VBN
him/PRP
only/RB
for/IN
the/DT
past/JJ
year/NN
and/CC
it/PRP
was/VBD
easy/JJ
to/TO
observe/VB
that/IN
he/PRP
is/VBZ
a/DT
quick/JJ
learner/NN
and/CC
hardworking/NN
./.
I/PRP
handled/VBD
the/DT
course/NN
Natural/NNP
Language/NNP
Processing/NNP
for/IN
him/PRP
during/IN
his/PRP$
sixth/JJ
semester/NN
./.
He/PRP
has/VBZ

```
also/RB
displayed/VBN
his/PRP$
dedication/NN
and/CC
willingness/NN
to/TO
learn/VB
on/IN
numerous/JJ
occasions/NNS
./.
On/IN
top/NN
of/IN
this/DT
,/,
he/PRP
is/VBZ
also/RB
very/RB
efficient/JJ
in/IN
completing/VBG
any/DT
task/NN
that/WDT
is/VBZ
given/VBN
to/TO
him/PRP
,/,
never/RB
one/CD
to/TO
complain/VB
irrespective/JJ
of/IN
any/DT
```

```
circumstances/NNS
./.
I/PRP
remember/VBP
him/PRP
submitting/VBG
NLP/NNP
weekly/JJ
tasks/NNS
well/RB
ahead/RB
of/IN
the/DT
specified/JJ
time/NN
period/NN
./.
Among/IN
the/DT
several/JJ
tasks/NNS
that/WDT
were/VBD
given/VBN
from/IN
time/NN
to/TO
time/NN
,/,
including/VBG
stop/JJ
word/NN
removal/NN
,/,
stemming/VBG
,/,
synsets/NNS
,/,
tweet/NN
```

```
tokenizer/NN
,/,
working/VBG
with/IN
porter/JJ
stemmer/NN
,/,
snowball/VB
stemmer/NN
and/CC
lancaster/NN
stemmer/NN
,/,
word/NN
lemmatizer/NN
,/,
count/NN
vectorizer/NN
and/CC
cosine/NN
similarity/NN
,/,
a/DT
few/JJ
of/IN
them/PRP
were/VBD
quite/RB
challenging/VBG
./.
One/CD
,/,
in/IN
particular/JJ
,/,
training/NN
and/CC
testing/VBG
gender-based/JJ
```

```
feature/NN
sets/NNS
which/WDT
he/PRP
had/VBD
a/DT
lot/NN
of/IN
trouble/NN
understanding/NN
./.
However/RB
,/,
along/IN
with/IN
my/PRP$
help/NN
and/CC
a/DT
few/JJ
of/IN
his/PRP$
friends/NNS
,/,
he/PRP
ultimately/RB
got/VBD
the/DT
job/NN
done/VBN
./.
Another/DT
quality/NN
that/WDT
caught/VBD
my/PRP$
attention/NN
during/IN
my/PRP$
```

several/JJ
interactions/NNS
with/IN
him/PRP
is/VBZ
that/IN
he/PRP
is/VBZ
very/RB
percipient/JJ
./.
He/PRP
tends/VBZ
to/TO
relate/VB
everything/NN
that/WDT
is/VBZ
taught/VBN
in/IN
class/NN
to/TO
real-time/JJ
situations/NNS
./.
There/EX
was/VBD
this/DT
one/CD
instance/NN
when/WRB
the/DT
topic/NN
of/IN
n-gram/JJ
linguistic/JJ
models/NNS
came/VBD
up/RB

```
,/,
he/PRP
was/VBD
very/RB
quick/JJ
to/TO
point/VB
out/RP
that/IN
this/DT
forms/VBZ
the/DT
basis/NN
for/IN
numerous/JJ
real-world/JJ
applications/NNS
such/JJ
as/IN
spell/NN
check/NN
and/CC
autocomplete/NN
./.
He/PRP
is/VBZ
also/RB
a/DT
keen/JJ
observer/RB
often/RB
pointing/VBG
out/RP
the/DT
mistakes/NNS
even/RB
in/IN
his/PRP$
work/NN
```

./.
During/IN
the/DT
time/NN
that/IN
I/PRP
have/VBP
known/VBN
him/PRP
,/,
he/PRP
had/VBD
encountered/VBN
various/JJ
challenges/NNS
which/WDT
he/PRP
had/VBD
addressed/VBN
through/IN
his/PRP$
well-directed/JJ
efforts/NNS
./.
I/PRP
also/RB
learnt/VBP
that/IN
he/PRP
is/VBZ
capable/JJ
of/IN
thinking/VBG
out/IN
of/IN
the/DT
box/NN
as/IN
was/VBD

```
the/DT
case/NN
when/WRB
he/PRP
started/VBD
putting/VBG
forth/NN
his/PRP$
ideas/NNS
for/IN
his/PRP$
project/NN
./.
After/IN
quite/RB
a/DT
few/JJ
briefings/NNS
,/,
he/PRP
decided/VBD
to/TO
choose/VB
the/DT
topic/NN
``/``
Understanding/NNP
word/NN
to/TO
vectors/NNS
''/''
./.
He/PRP
had/VBD
initially/RB
considered/VBN
the/DT
TF-IDF/NNP
scores/NNS
```

concerning/VBG
different/JJ
input/NN
documents/NNS
or/CC
statements/NNS
,/,
after/IN
which/WDT
he/PRP
took/VBD
the/DT
time/NN
to/TO
produce/VB
the/DT
word/NN
embeddings/NNS
for/IN
each/DT
document/NN
CBOW/NNP
models/NNS
./.
Apart/RB
from/IN
his/PRP$
technical/JJ
skills/NNS
,/,
his/PRP$
talent/NN
for/IN
writing/NN
and/CC
documentation/NN
were/VBD
also/RB
quite/RB

evident/JJ
when/WRB
I/PRP
had/VBD
a/DT
look/NN
at/IN
his/PRP$
project/NN
report/NN
./.
The/DT
diversity/NN
in/IN
his/PRP$
repertoire/NN
is/VBZ
what/WP
struck/VBD
me/PRP
the/DT
most/RBS
./.
Hence/NNP
,/,
I/PRP
believe/VBP
that/IN
AAA/NNP
has/VBZ
the/DT
necessary/JJ
set/NN
of/IN
skills/NNS
and/CC
the/DT
perfect/JJ
attitude/NN

```
to/TO
perform/VB
well/RB
in/IN
his/PRP$
master/NN
'/NNP
s/NN
programme/NN
./.
I/PRP
am/VBP
confident/JJ
that/IN
he/PRP
will/MD
become/VB
an/DT
important/JJ
asset/NN
to/TO
your/PRP$
university/NN
./.
I/PRP
have/VBP
no/DT
qualms/NN
or/CC
reservations/NNS
in/IN
recommending/VBG
him/PRP
for/IN
admission/NN
at/IN
your/PRP$
esteemed/JJ
university/NN
```

```
          ./.
          You/PRP
          may/MD
          feel/VB
          free/JJ
          to/TO
          get/VB
          in/IN
          touch/NN
          with/IN
          me/PRP
          regarding/VBG
          any/DT
          queries/NNS
          with/IN
          respect/NN
          to/TO
          his/PRP$
          recommendation/NN
          ./.)
```

In [18]: `result2.draw()`

In [19]: `chunks2 = nltk.ne_chunk(pos_tags)`

In [20]: `print(chunks2)`

```
(S
  I/PRP
  am/VBP
  happy/JJ
  to/TO
  write/VB
  this/DT
  letter/NN
  of/IN
  recommendation/NN
  for/IN
```

```
AAA/NNP
who/WP
intends/VBZ
to/TO
pursue/VB
a/DT
Master/NN
's/POS
degree/NN
at/IN
your/PRP$
prestigious/JJ
university/NN
./.
I/PRP
have/VBP
known/VBN
him/PRP
only/RB
for/IN
the/DT
past/JJ
year/NN
and/CC
it/PRP
was/VBD
easy/JJ
to/TO
observe/VB
that/IN
he/PRP
is/VBZ
a/DT
quick/JJ
learner/NN
and/CC
hardworking/NN
./.
I/PRP
```

```
handled/VBD
the/DT
course/NN
(ORGANIZATION Natural/NNP Language/NNP)
Processing/NNP
for/IN
him/PRP
during/IN
his/PRP$
sixth/JJ
semester/NN
./.
He/PRP
has/VBZ
also/RB
displayed/VBN
his/PRP$
dedication/NN
and/CC
willingness/NN
to/TO
learn/VB
on/IN
numerous/JJ
occasions/NNS
./.
On/IN
top/NN
of/IN
this/DT
,/,
he/PRP
is/VBZ
also/RB
very/RB
efficient/JJ
in/IN
completing/VBG
any/DT
```

task/NN
that/WDT
is/VBZ
given/VBN
to/TO
him/PRP
,/,
never/RB
one/CD
to/TO
complain/VB
irrespective/JJ
of/IN
any/DT
circumstances/NNS
./.
I/PRP
remember/VBP
him/PRP
submitting/VBG
(ORGANIZATION NLP/NNP)
weekly/JJ
tasks/NNS
well/RB
ahead/RB
of/IN
the/DT
specified/JJ
time/NN
period/NN
./.
Among/IN
the/DT
several/JJ
tasks/NNS
that/WDT
were/VBD
given/VBN
from/IN

```
time/NN
to/TO
time/NN
,/,
including/VBG
stop/JJ
word/NN
removal/NN
,/,
stemming/VBG
,/,
synsets/NNS
,/,
tweet/NN
tokenizer/NN
,/,
working/VBG
with/IN
porter/JJ
stemmer/NN
,/,
snowball/VB
stemmer/NN
and/CC
lancaster/NN
stemmer/NN
,/,
word/NN
lemmatizer/NN
,/,
count/NN
vectorizer/NN
and/CC
cosine/NN
similarity/NN
,/,
a/DT
few/JJ
of/IN
```

```
them/PRP
were/VBD
quite/RB
challenging/VBG
./.
One/CD
,/,
in/IN
particular/JJ
,/,
training/NN
and/CC
testing/VBG
gender-based/JJ
feature/NN
sets/NNS
which/WDT
he/PRP
had/VBD
a/DT
lot/NN
of/IN
trouble/NN
understanding/NN
./.
However/RB
,/,
along/IN
with/IN
my/PRP$
help/NN
and/CC
a/DT
few/JJ
of/IN
his/PRP$
friends/NNS
,/,
he/PRP
```

ultimately/RB
got/VBD
the/DT
job/NN
done/VBN
./.
Another/DT
quality/NN
that/WDT
caught/VBD
my/PRP$
attention/NN
during/IN
my/PRP$
several/JJ
interactions/NNS
with/IN
him/PRP
is/VBZ
that/IN
he/PRP
is/VBZ
very/RB
percipient/JJ
./.
He/PRP
tends/VBZ
to/TO
relate/VB
everything/NN
that/WDT
is/VBZ
taught/VBN
in/IN
class/NN
to/TO
real-time/JJ
situations/NNS
./.

```
There/EX
was/VBD
this/DT
one/CD
instance/NN
when/WRB
the/DT
topic/NN
of/IN
n-gram/JJ
linguistic/JJ
models/NNS
came/VBD
up/RB
,/,
he/PRP
was/VBD
very/RB
quick/JJ
to/TO
point/VB
out/RP
that/IN
this/DT
forms/VBZ
the/DT
basis/NN
for/IN
numerous/JJ
real-world/JJ
applications/NNS
such/JJ
as/IN
spell/NN
check/NN
and/CC
autocomplete/NN
./.
He/PRP
```

is/VBZ
also/RB
a/DT
keen/JJ
observer/RB
often/RB
pointing/VBG
out/RP
the/DT
mistakes/NNS
even/RB
in/IN
his/PRP$
work/NN
./.
During/IN
the/DT
time/NN
that/IN
I/PRP
have/VBP
known/VBN
him/PRP
,/,
he/PRP
had/VBD
encountered/VBN
various/JJ
challenges/NNS
which/WDT
he/PRP
had/VBD
addressed/VBN
through/IN
his/PRP$
well-directed/JJ
efforts/NNS
./.
I/PRP

also/RB
learnt/VBP
that/IN
he/PRP
is/VBZ
capable/JJ
of/IN
thinking/VBG
out/IN
of/IN
the/DT
box/NN
as/IN
was/VBD
the/DT
case/NN
when/WRB
he/PRP
started/VBD
putting/VBG
forth/NN
his/PRP$
ideas/NNS
for/IN
his/PRP$
project/NN
./.
After/IN
quite/RB
a/DT
few/JJ
briefings/NNS
,/,
he/PRP
decided/VBD
to/TO
choose/VB
the/DT
topic/NN

```
``/``
Understanding/NNP
word/NN
to/TO
vectors/NNS
''/''
./.
He/PRP
had/VBD
initially/RB
considered/VBN
the/DT
TF-IDF/NNP
scores/NNS
concerning/VBG
different/JJ
input/NN
documents/NNS
or/CC
statements/NNS
,/,
after/IN
which/WDT
he/PRP
took/VBD
the/DT
time/NN
to/TO
produce/VB
the/DT
word/NN
embeddings/NNS
for/IN
each/DT
document/NN
(ORGANIZATION CBOW/NNP)
models/NNS
./.
Apart/RB
```

```
from/IN
his/PRP$
technical/JJ
skills/NNS
,/,
his/PRP$
talent/NN
for/IN
writing/NN
and/CC
documentation/NN
were/VBD
also/RB
quite/RB
evident/JJ
when/WRB
I/PRP
had/VBD
a/DT
look/NN
at/IN
his/PRP$
project/NN
report/NN
./.
The/DT
diversity/NN
in/IN
his/PRP$
repertoire/NN
is/VBZ
what/WP
struck/VBD
me/PRP
the/DT
most/RBS
./.
(PERSON Hence/NNP)
,/,
```

```
I/PRP
believe/VBP
that/IN
(ORGANIZATION AAA/NNP)
has/VBZ
the/DT
necessary/JJ
set/NN
of/IN
skills/NNS
and/CC
the/DT
perfect/JJ
attitude/NN
to/TO
perform/VB
well/RB
in/IN
his/PRP$
master/NN
'/NNP
s/NN
programme/NN
./.
I/PRP
am/VBP
confident/JJ
that/IN
he/PRP
will/MD
become/VB
an/DT
important/JJ
asset/NN
to/TO
your/PRP$
university/NN
./.
I/PRP
```

```
have/VBP
no/DT
qualms/NN
or/CC
reservations/NNS
in/IN
recommending/VBG
him/PRP
for/IN
admission/NN
at/IN
your/PRP$
esteemed/JJ
university/NN
./.
You/PRP
may/MD
feel/VB
free/JJ
to/TO
get/VB
in/IN
touch/NN
with/IN
me/PRP
regarding/VBG
any/DT
queries/NNS
with/IN
respect/NN
to/TO
his/PRP$
recommendation/NN
./.)
```

In [21]: `chunks2.draw()`

# SPACY

```
In [24]: import spacy
```

```
In [25]: nlp = spacy.load('en_core_web_sm')
```

```
In [26]: example = "Apple Inc. is an American multinational technology company h
         eadquartered in Cupertino, California, that designs, develops, and sell
         s consumer electronics."
```

```
In [27]: doc = nlp(example)

         for ent in doc.ents:
             print(ent.text, ent.label_)
```

```
Apple Inc. ORG
American NORP
Cupertino GPE
California GPE
```

```
In [28]: eg = 'I was pleased to know that he applied the concepts in his interns
         hip extensively to build a professional tool for Intellect Design Aren
         a. He designed this tool to make the process of configuring a Logical D
         ata Model easier and much faster. It consisted of a User Interface (UI)
          that can replicate back-end tasks such as inserting data in a database
          at the click of a button. His task was cut out for him as the tool was
          being built for J.P. Morgan Chase as a client and hence there was no r
         oom for error. I am proud to say that the tool, which he built over a c
         ourse of two months, was pushed to production at the end of his interns
         hip. '
```

```
In [29]: doc = nlp(eg)

         for ent in doc.ents:
             print(ent.text, ent.label_)
```

```
Logical Data ORG
```

```
UI ORG
J.P. Morgan Chase PERSON
two months DATE
```

In [30]: 
```python
# WEB SCRAPPING
from spacy import displacy
displacy.render(doc, style='ent')
```

I was pleased to know that he applied the concepts in his internship extensively to build a professional tool for Intellect Design Arena. He designed this tool to make the process of configuring a  Logical Data **ORG**  Model easier and much faster. It consisted of a User Interface (  UI **ORG**  ) that can replicate back-end tasks such as inserting data in a database at the click of a button. His task was cut out for him as the tool was being built for  J.P. Morgan Chase **PERSON**  as a client and hence there was no room for error. I am proud to say that the tool, which he built over a course of  two months **DATE** , was pushed to production at the end of his internship.

In [ ]: