Overview

Objective of this notebook is 4-folds -

1. **Assemble / Generate** meeting transcripts data. (obvious needs of preprocessing and cleaning with a little EDA)
2. Using some example outputs - **form heuristics** (based on NLP features of the interested input)
3. **Validate the heuristics** -- how well does the heuristic extract necessary items? (accordingly repeat this step and the previous till desired results comeup)
4. Formalize the operations to a single function for **service intergration**

Evee-Output

Calling out my assumptions of what can be a good response from the NLP service.
From the transcription, I am considering following information to be of interest for a meeting MoM.

Content of interest in input

1. **Directly Address Evee**

   - `Hey Evee, {can you | please  | can you please} add  (task) X to person (Y)`
   - *Just a sample. Same sentence can be said in various ways*
     - `Evee, {can you | please | ... } put (task) X to person (Y)'s list`
     - `Remember to assign (task) X to (person) Y, Evee`
   - Above is easier to implement as we can narrow down to those part of transcripts where Evee is adressed

1. **Actionable or Commitable Item phrases**

   - Dialogues with possible action items
     `I have been doing this but will update you with other alternatives`
   - **Note:-** Action items can be part of a previous reference

     ```
     05:10 --> 05:12 : I was looking into (task) X and I did action A.
     05:13 --> 05:16 : True (person name) Y, but I feel we should also try other (ac
     tion) B. Can (you| person Y) do it?
     05:16 --> 05:17 : Sure
     ```

   - Once the actions are identified, map with the person's involved
     - Involved person may be already mentioned in the tasks
     - Check for phrases of `I|You` etc.

Note: I will assume there can be false positives of tasks generated although it wasn't decided to go ahead with it..
Overall, more tasks generated is better than less tasks

Also, assumption is if the ownership of a task changes we can add both previous and the new user and let it be modifiable through actionable cards

Service Output

```
## list of todos
results = [{actionEntity  , intent , peopleEntity, MoMString}, ....]
```

where
actionEntity = token(s) describing the tasks

intent = verb - Design/Develop etc.

peopleEntity = names list of persons involved

MoMString = generated from above three to be directly used in adaptive card

Data assemble

In [70]:

```
## Taking very simple static strings as text for now -
## In hack, we need a vtt file parser to extract text from therein
## For example,

"""
0:0:0.0 --> 0:0:5.290
<v 1ae37f18-c4fb-454a-8514-ad5b764b92f1@72f988bf-86f1-41af-91ab-2d7cd011db47>Yea
h, I think please don't read the transcript because this transcripts for my Engli
sh especially is very bad so.</v>

0:0:9.250 --> 0:0:11.520
<v 1ae37f18-c4fb-454a-8514-ad5b764b92f1@72f988bf-86f1-41af-91ab-2d7cd011db47>Yea
h, I think so. Can I start now?</v>

0:0:14.970 --> 0:0:15.450
<v 1725246c-8250-4d5b-b165-64eb54294550@72f988bf-86f1-41af-91ab-2d7cd011db47>Yea
h.</v>

"""

## My temporary starting samples
texts = [
    "Well, Evee, please put the NLP model formation as part of Amartya's work",
# direct-address item
    "Yes, I was trying to make an extensible design, but I will look for other p
ossibilities and come back to you..", # intrinsic action item
    "Can you please do it ??", ## example of action item having previous referenc
es
    "Hey Evee, can you add NLP modelling to Amartya's list"
]
```

Overall NLP workflow

This will consist of -

- Applying heuristics based on (**1) POS tags (2) Dependency tree as shown below**
- Thereafter, we need to check the impact %age of the heuristics and change them accordingly
  - Idea is to have a high recall i.e. more tasks are preferred and false positives are not very harmful

We also need to look for usual relationships sentences within a doc and a tokens within a sentence

In [71]:
```
import spacy
from spacy import displacy
```

In [72]:
```
# load english language model
nlp = spacy.load('en_core_web_sm',disable=['textcat'])
```

In [73]:
```
!pip install visualise-spacy-tree
```

```
Requirement already satisfied: visualise-spacy-tree in /opt/conda/lib/python
3.7/site-packages (0.0.6)
Requirement already satisfied: pydot==1.4.1 in /opt/conda/lib/python3.7/site
-packages (from visualise-spacy-tree) (1.4.1)
Requirement already satisfied: pyparsing>=2.1.4 in /opt/conda/lib/python3.7/
site-packages (from pydot==1.4.1->visualise-spacy-tree) (2.4.7)
```

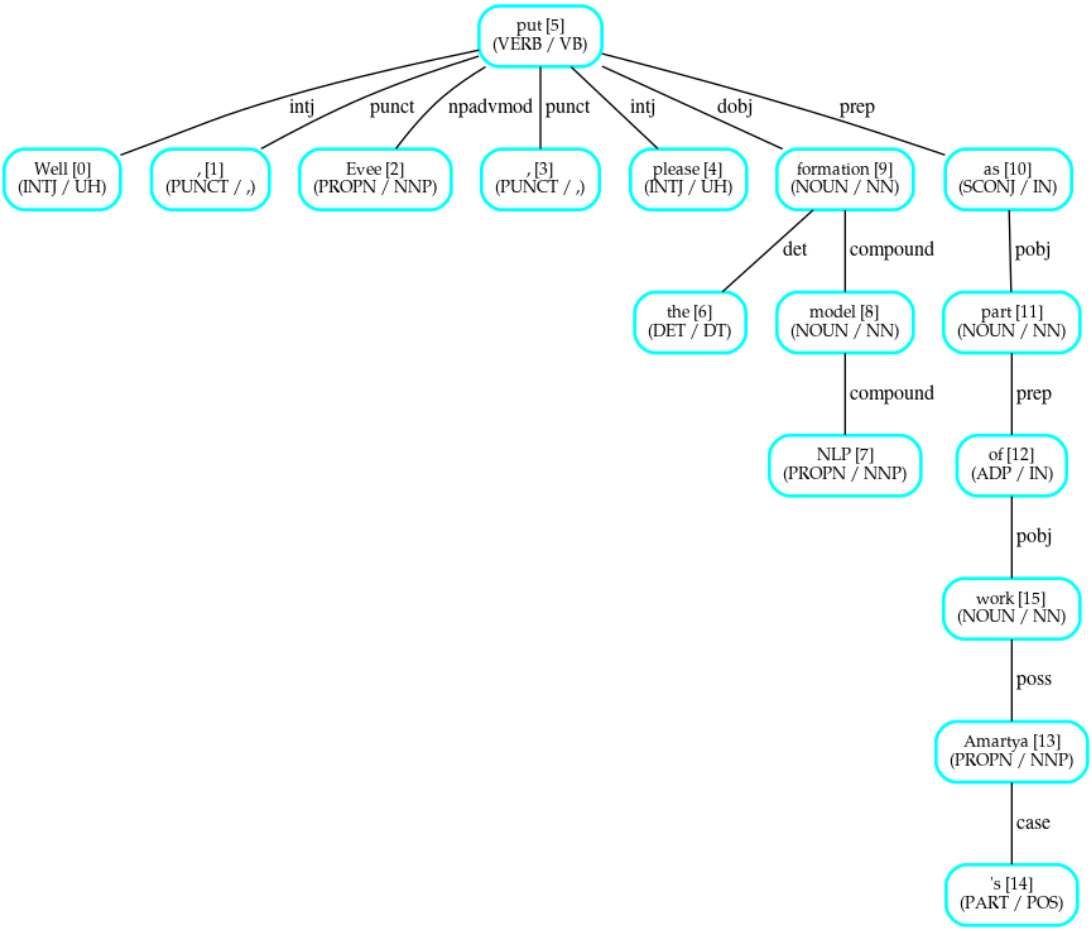
In [74]:
```
import visualise_spacy_tree
from IPython.display import Image, display
```

Testing out the libs with sample sentences --

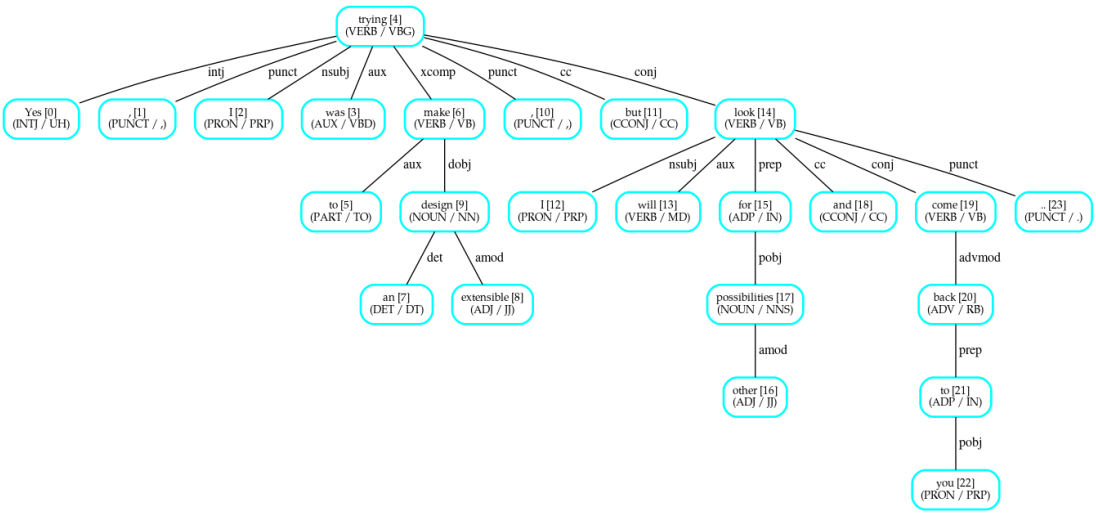
In [75]:

```
for text in texts:
    print(text)
    doc = nlp(text)

#     for token in doc:

#         print(token.text, token.dep_, token.head.text, token.head.pos_,
#             [child for child in token.children])

#     displacy.render(doc, style='dep',jupyter=True)
    png = visualise_spacy_tree.create_png(doc)
    display(Image(png))
    print (80*"=")
```

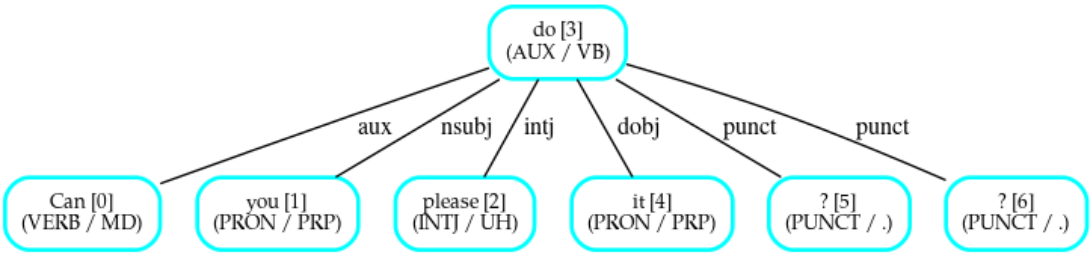
```
Well, Evee, please put the NLP model formation as part of Amartya's work
```



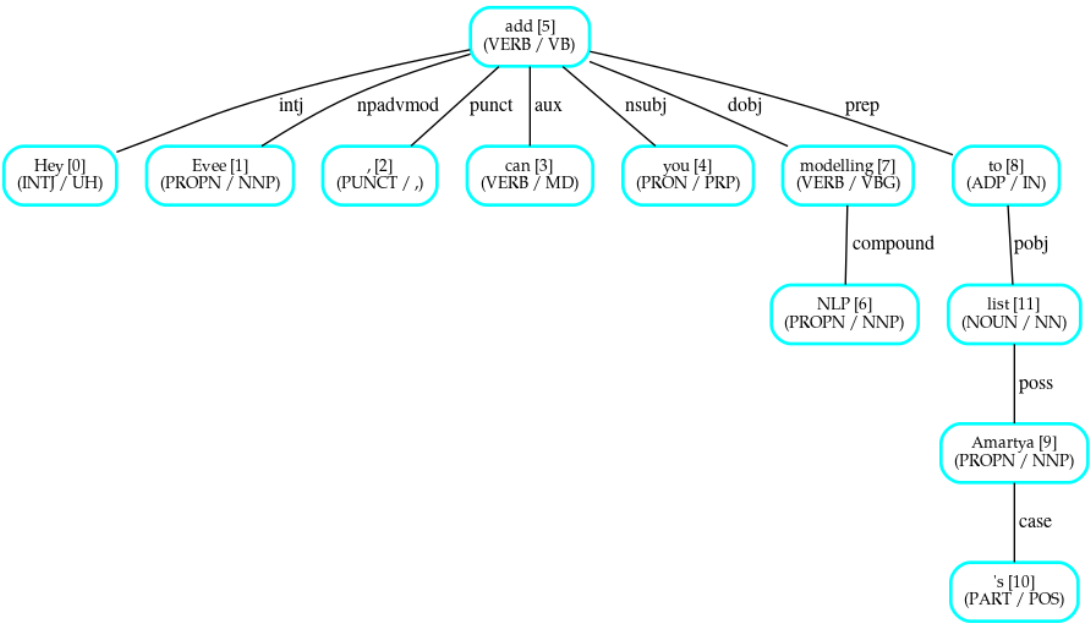

```
================================================================================
====
Yes, I was trying to make an extensible design, but I will look for other po
ssibilities and come back to you..
```



```
================================================================================
====
Can you please do it ??
```




```
================================================================================
====
Hey Evee, can you add NLP modelling to Amartya's list
```




```
================================================================================
====
```

In [76]:

```
## A bit of noun-chunking as well

for text in texts:

    print (text)
    doc= nlp(text)

    for i, chunk in enumerate(doc.noun_chunks):
        print(i, chunk.text, chunk.root.text, chunk.root.dep_,
                chunk.root.head.text)

    print(80 * "=")
```

```
Well, Evee, please put the NLP model formation as part of Amartya's work
0 the NLP model formation formation dobj put
1 part part pobj as
2 Amartya's work work pobj of
================================================================================
====
Yes, I was trying to make an extensible design, but I will look for other po
ssibilities and come back to you..
0 I I nsubj trying
1 an extensible design design dobj make
2 I I nsubj look
3 other possibilities possibilities pobj for
4 you you pobj to
================================================================================
====
Can you please do it ??
0 you you nsubj do
1 it it dobj do
================================================================================
====
Hey Evee, can you add NLP modelling to Amartya's list
0 you you nsubj add
1 Amartya's list list pobj to
================================================================================
====
```

Directly mentioning evee

In [77]:

```
## Single sentence statments, all mentioning evee
## A task is explicityly mentioned in the statment
## Owner may or may not be explicitly mentioned
## Also it is assumed Evee is mentioned at the beginning
## Note! Currently , no transcript will have these kind of sentences
## IN reality transcripts might not add "," after Evee or evee can be misplaced b
y some other token
## we can also employ some audio transcription to transcribe and give quick updat
e in the meeting

evee_texts = [

    ## Starters
    "Evee, add calendar data source implementation as a next step", # task witho
ut a owner
    "Hey Evee, note NLP model formation as Amartya's task item", # task + owner

    ## Conjunctions
    "Hey Evee, note down that Jessica will organize a sync up tomorrow", # task
+ owner ('that' as a conjunction)
    "Hey Evee, note that Calendar Search CR is to be done by Patrick", # task +
owner ('that' as a conjunction')

    ## Interjections
    "Well Evee, please give implementation of databse to John", # task + owner
('please' as interjection)
    "Hi Evee, please assign to Jane the task of review and approval of the desig
n", # another task + owner  (ditto but owner comes first)

    ## Questions
    "Well Evee, Can you assign the implementation of databse to John?", # task +
owner ('question' starting with can)
    "Hey Evee, Can you put design review to Jake's Todo?", # task + owner

    ## Implicit
    "Hey Evee, Jack will update the designs with new redlines", # task+owner wit
h indirect intent (implicitly evee takes a note)
    "Evee, We will organize Ravi's birthday-party tomorrow",
    "Evee, We will organize a welcome party for David ",
    "Hey Evee, designs will be updated by Jack" # task+owner with indirect inten
t (passive voice)
]
```

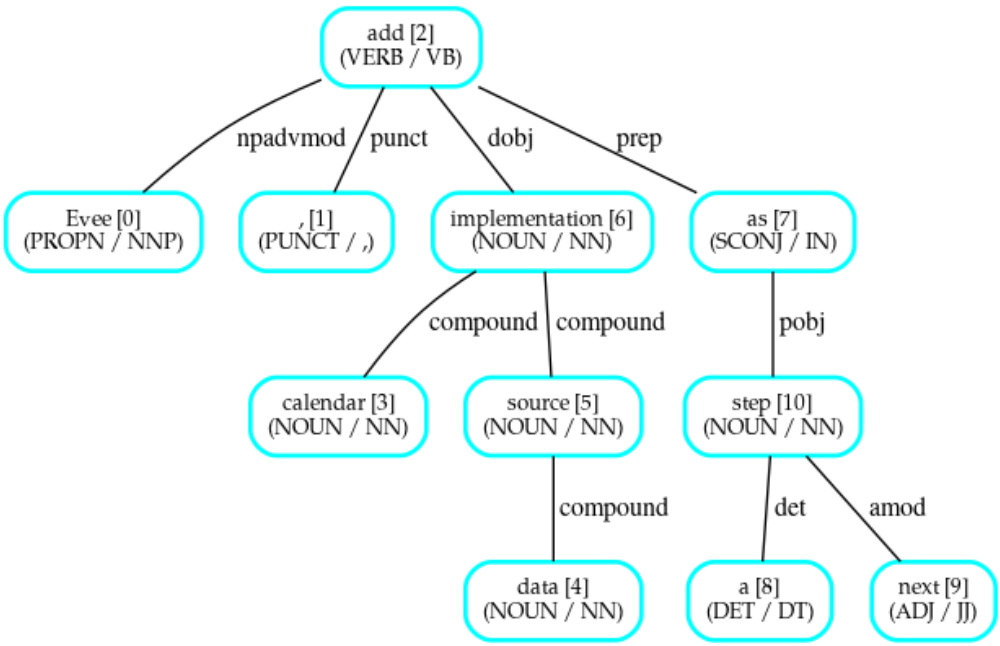
In [78]:

```
def gen_sent_deps(sent):

    png = visualise_spacy_tree.create_png(nlp(sent))
    display(Image(png))
```

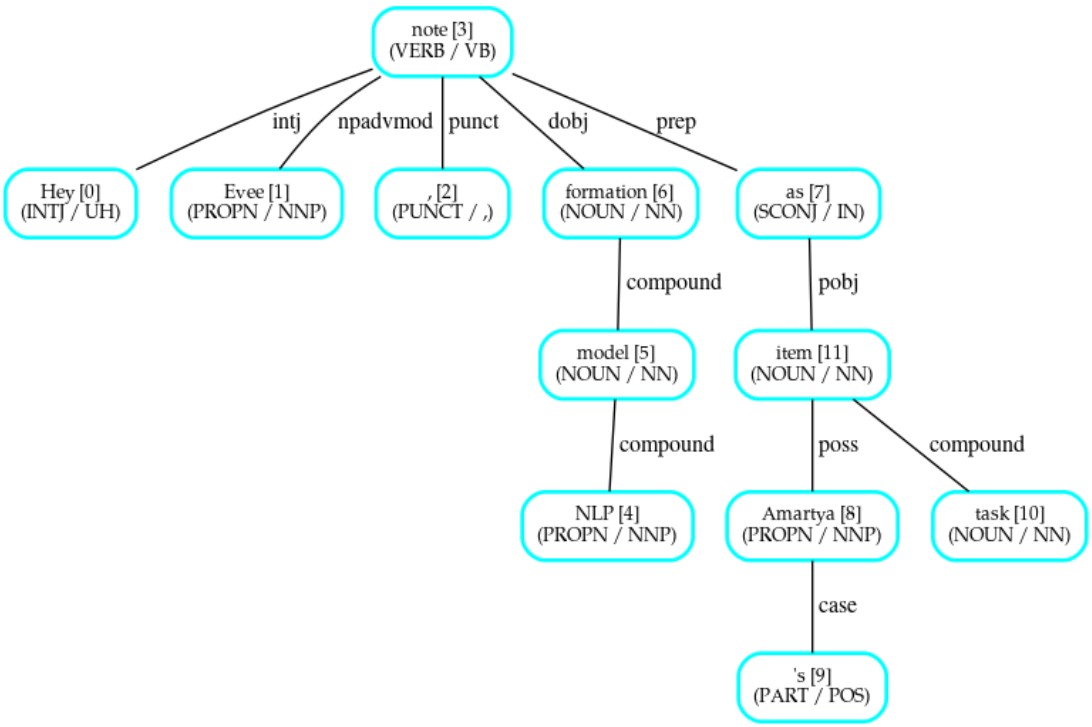
In [79]:

```
for text in evee_texts:
    print (text)
    gen_sent_deps(text)
```

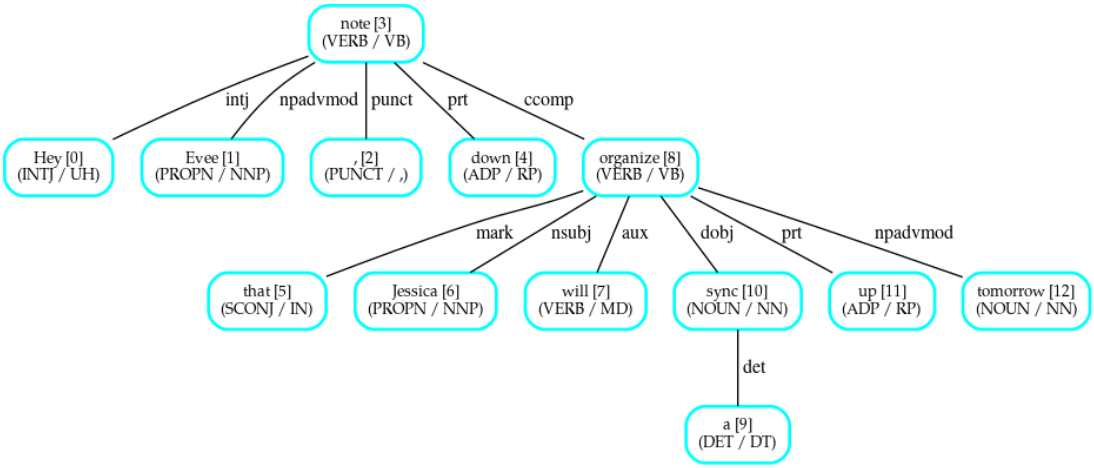
```
Evee, add calendar data source implementation as a next step
```



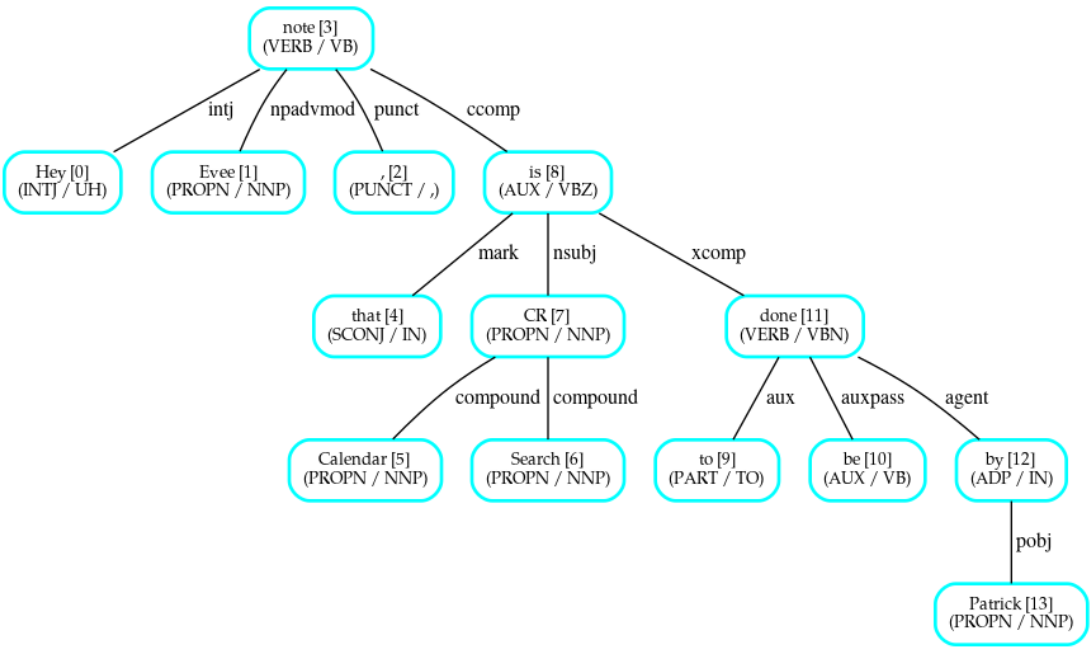

```
Hey Evee, note NLP model formation as Amartya's task item
```



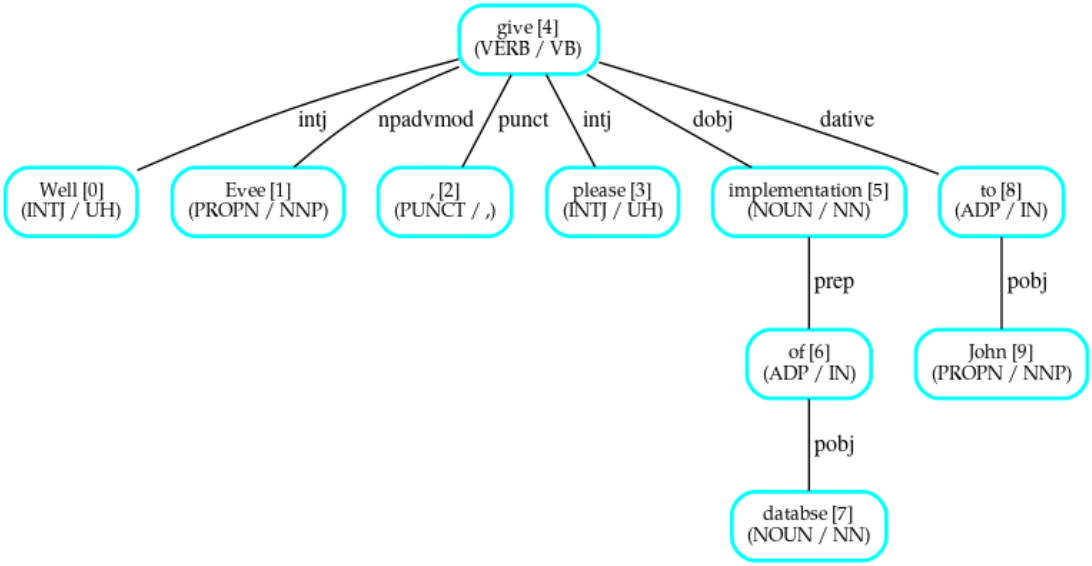

```
Hey Evee, note down that Jessica will organize a sync up tomorrow
```



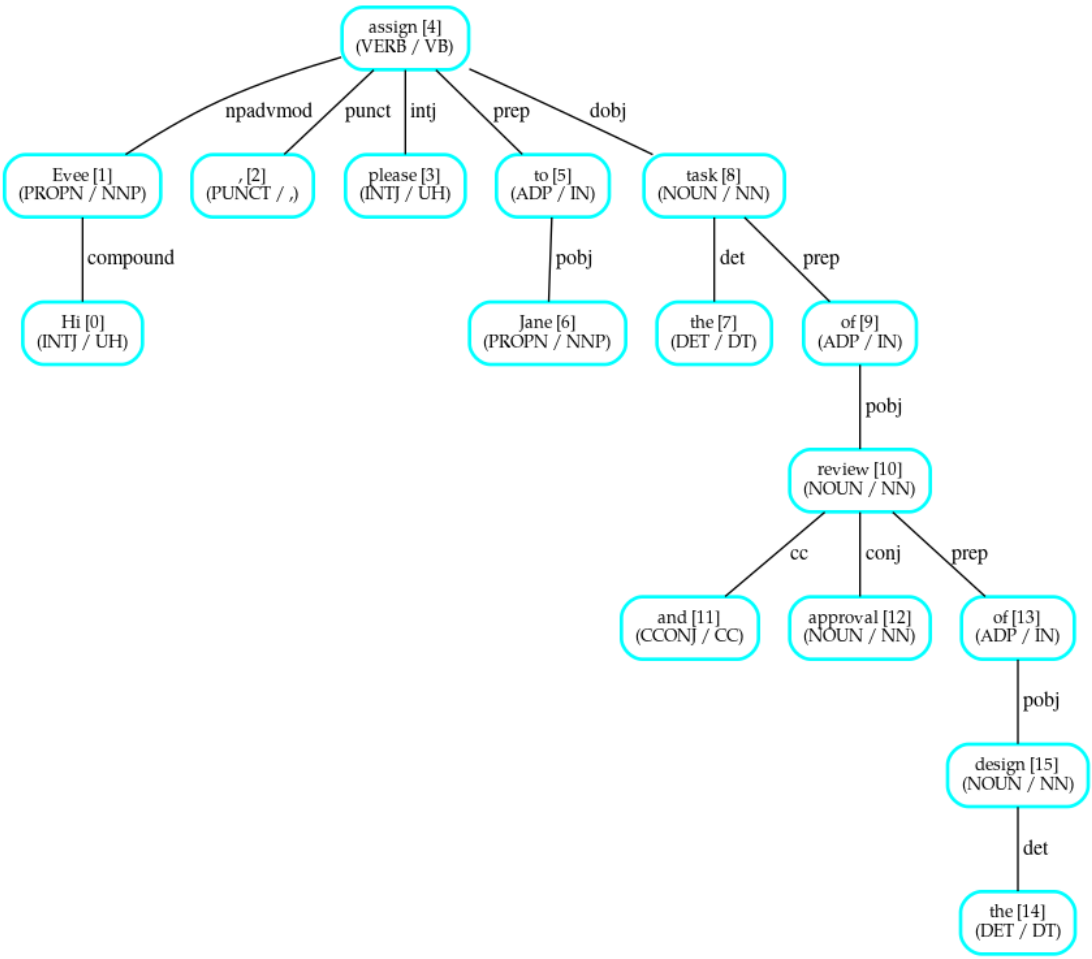

```
Hey Evee, note that Calendar Search CR is to be done by Patrick
```



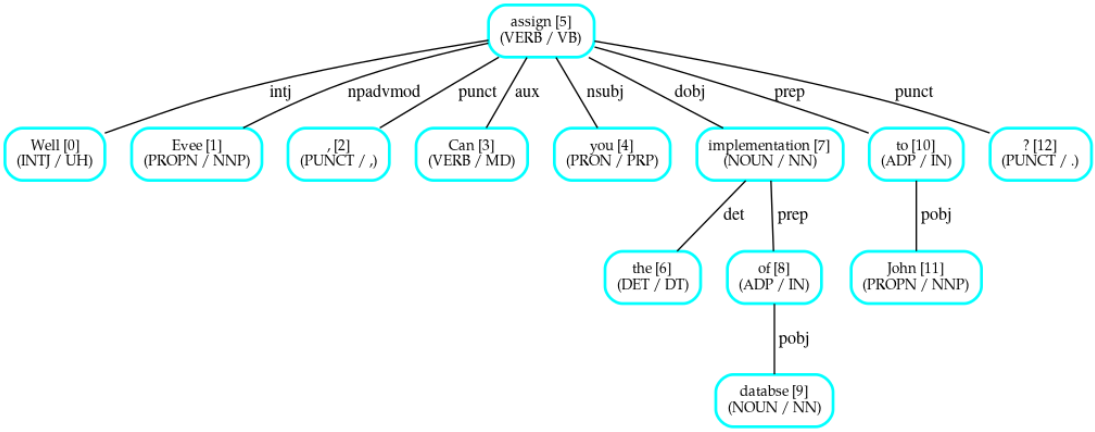

```
Well Evee, please give implementation of databse to John
```



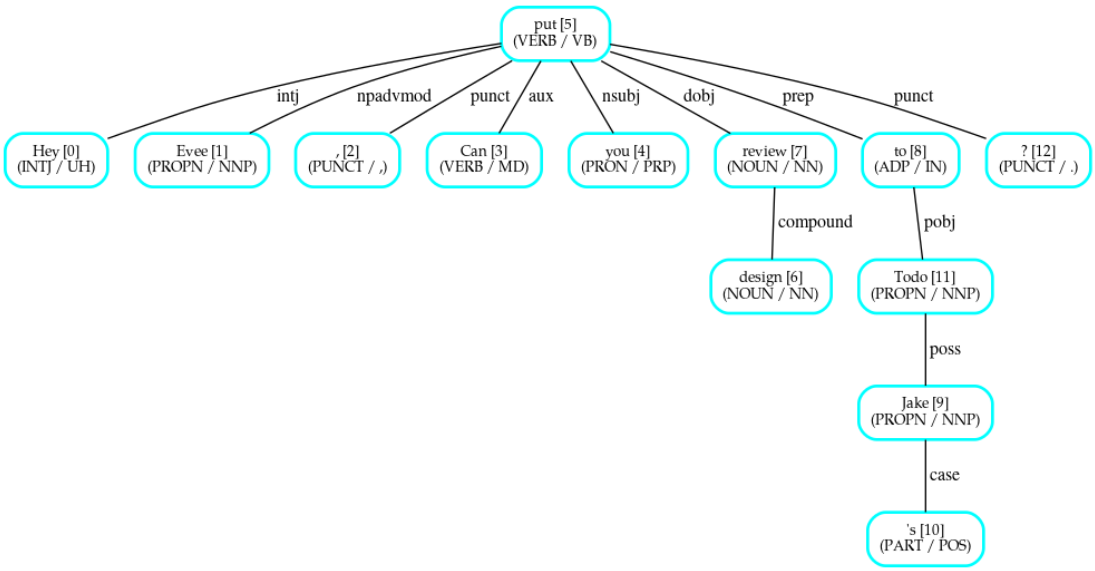

```
Hi Evee, please assign to Jane the task of review and approval of the design
```



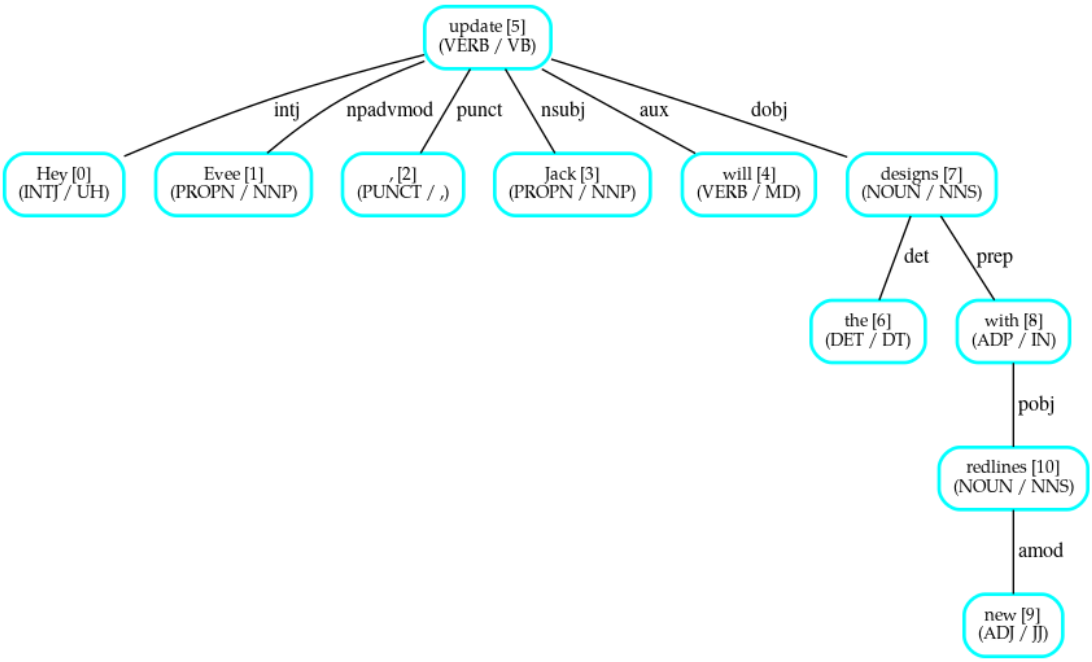

```
Well Evee, Can you assign the implementation of databse to John?
```



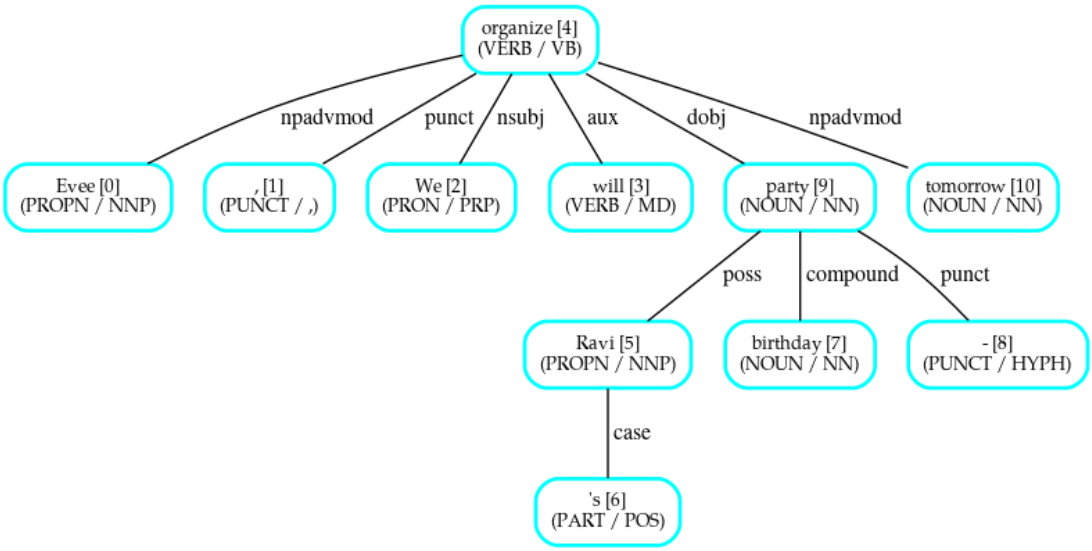

```
Hey Evee, Can you put design review to Jake's Todo?
```



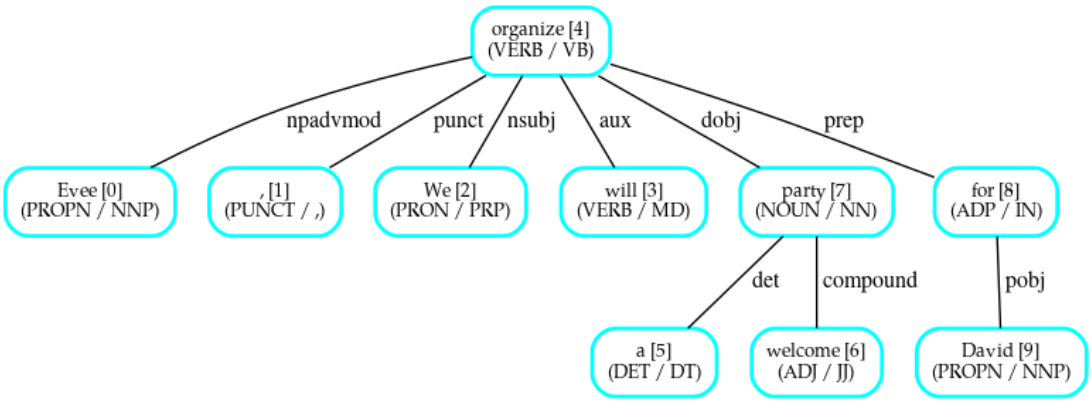

```
Hey Evee, Jack will update the designs with new redlines
```



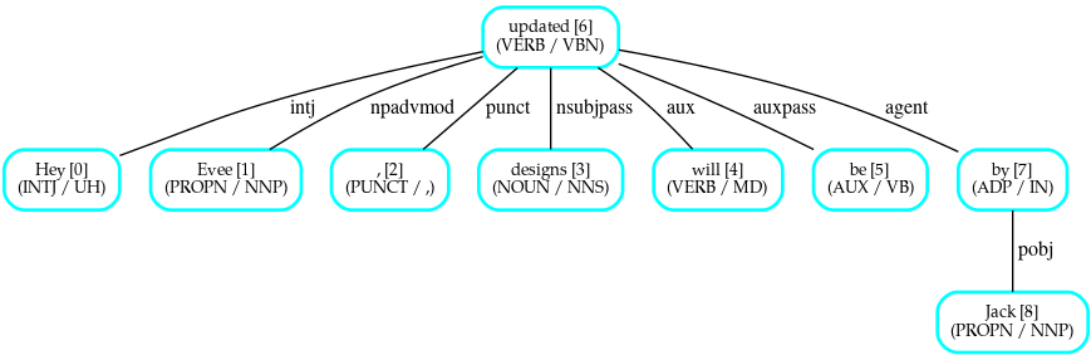

```
Evee, We will organize Ravi's birthday-party tomorrow
```




```
Evee, We will organize a welcome party for David
```




```
Hey Evee, designs will be updated by Jack
```



In [80]:
```
spacy.explain("ADP")
```

Out[80]:
```
'adposition'
```

In [102]:

```
from spacy.matcher import Matcher
matcher = Matcher(nlp.vocab)



doctest = nlp("Hey Evee, Can you put design review to Jake's Todo?")

print(doctest[0:3])

pattern = [{'POS': 'VERB'}, {'POS': 'PROPN'}]
pattern2 = [{'POS': 'VERB'}, {'POS': 'PRON'}]
matcher = Matcher(nlp.vocab)

matcher.add("question", None, pattern, pattern2)
isQuestion = len(matcher(doctest)) > 0

print (isQuestion)
print ([(ent.label_, ent.text) for ent in doctest.ents]) ## By trying out differ
ent input types,
                                                        ##we can see that NER is
not that well defined here
```

```
Hey Evee,
True
[('GPE', 'Jake')]
```

In [96]:

```
## Simple rules from above

## DOBJ says a lot!
## If A root verb has a dobj subtree it probably can be the task (NOT ALWAYS)
## even if I add a interjection like 'please', dobj subtrees can identify and ext
ract the action phrases easily


## DOBJ exceptions -- CONJUNCTIONS
## dobj subtree can be absent if ccomp subtrees are present (here again, it's a p
assive voice)
## ccomp subtrees are present for keywords like 'that', 'if', 'whether' etc. (the
se are SCONJ)
## We can determine these conjunctive items and find their head verbs.. then appl
y the dobj/ nsubj rules

## Further Exceptions -- IMPLICIT INTENT
## If Root verb has nsubj subtree then intent is implicit and the root verb  (+do
bj subtree) likely to be part of action
## if root verb has nsubjpass then the intent might be implicit as well but now w
e need to find the action somewhere within nsubjpass subtree
## Note: nsubjpass is absent when we have explicit intent given in the text, even
when we have it in a passive voice

## OWNER DETECTION
## Owners can be in a dative part of the tree
## When owner's missing, just no other PROPN nouns come up
## May be, tracking PROPNs is a good idea of finding them


from spacy.matcher import Matcher

def get_owners(dialog):

    doc = nlp(dialog)
    pers = [ent.text for ent in doc.ents\
            if ent.label_ == "PERSON" or ent.label_ == "ORG"\
            or ent.label_ == "PRODUCT" or ent.label_ == "GPE"]

    print ("Owners = "+ str(pers))
    return pers


def get_actions(dialog):

    print ("Dialog -" + dialog)
    doc = nlp(dialog)
    rootTok = next(tok for tok in doc if tok.dep_=="ROOT")
```

```
    isSimple = not any(cTok.dep_ in ['nsubjpass', 'ccomp'] for cTok in rootTok.
children)

    if(isSimple):
        dobjTok = next(cTok for cTok in rootTok.children if cTok.dep_ == "dob
j")
        phrase = " ".join(t.text for t in dobjTok.subtree)

        isSubjPresent = any(cTok.dep_ == 'nsubj' for cTok in rootTok.children)

        ## If rootverb has subject, prepend it only if it is not referring to Eve
e
        if (isSubjPresent):

            ## very naive way to determine if rootverb refers to Evee
            ## Closest proper noun is Evee ??
#             propns = [tok.text for tok in rootTok.lefts if tok.pos_ == "PROPN"]
#             print (propns)
#             isEveeVerb = propns[-1] == "Evee" or propns[-1] == "evee" ## Checki
ng with evee, Evee hardcoded isn't optimal
#                                                                    ## Maybe
a phonetic match is better here



#             if (not isEveeVerb):
#                 phrase = rootTok.text + ' ' + phrase


            ## Another better way to determine is to find whether there is a ques
tion to Evee
            ## The  nsubj will then be referring to evee only

            ## Is there a question in the sentence ?

            p1 = [{'POS': 'VERB'}, {'POS': 'PROPN'}]
            p2 = [{'POS': 'VERB'}, {'POS': 'PRON'}]

            matcher = Matcher(nlp.vocab)

            matcher.add("question", None, p1, p2)
            isQuestion = len(matcher(doc)) > 0

            if (not isQuestion):
                phrase = rootTok.text + ' ' + phrase


        print ("Root -"+rootTok.text)
```

```
        print ("Direct Object -"+dobjTok.text)
        print ("Action phrase- "+phrase)
    else:
        print(rootTok, isSimple)


for text in evee_texts:
    get_actions(text)
    print(80*"-")
    get_owners(text)
    print(80*"=")
```

```
Dialog -Evee, add calendar data source implementation as a next step
Root -add
Direct Object -implementation
Action phrase- calendar data source implementation
--------------------------------------------------------------------------
----
Owners = ['Evee']
==========================================================================
====
Dialog -Hey Evee, note NLP model formation as Amartya's task item
Root -note
Direct Object -formation
Action phrase- NLP model formation
--------------------------------------------------------------------------
----
Owners = ['Hey Evee', 'NLP', 'Amartya']
==========================================================================
====
Dialog -Hey Evee, note down that Jessica will organize a sync up tomorrow
note False
--------------------------------------------------------------------------
----
Owners = ['Hey Evee', 'Jessica']
==========================================================================
====
Dialog -Hey Evee, note that Calendar Search CR is to be done by Patrick
note False
--------------------------------------------------------------------------
----
Owners = ['Hey Evee', 'Calendar Search CR', 'Patrick']
==========================================================================
====
Dialog -Well Evee, please give implementation of databse to John
Root -give
Direct Object -implementation
Action phrase- implementation of databse
--------------------------------------------------------------------------
----
Owners = ['Evee', 'John']
==========================================================================
====
Dialog -Hi Evee, please assign to Jane the task of review and approval of th
e design
Root -assign
Direct Object -task
Action phrase- the task of review and approval of the design
--------------------------------------------------------------------------
----
```

```
Owners = ['Evee', 'Jane']
================================================================================
====
Dialog -Well Evee, Can you assign the implementation of databse to John?
Root -assign
Direct Object -implementation
Action phrase- the implementation of databse
--------------------------------------------------------------------------------
----
Owners = ['Evee', 'John']
================================================================================
====
Dialog -Hey Evee, Can you put design review to Jake's Todo?
Root -put
Direct Object -review
Action phrase- design review
--------------------------------------------------------------------------------
----
Owners = ['Jake']
================================================================================
====
Dialog -Hey Evee, Jack will update the designs with new redlines
Root -update
Direct Object -designs
Action phrase- update the designs with new redlines
--------------------------------------------------------------------------------
----
Owners = ['Hey Evee', 'Jack']
================================================================================
====
Dialog -Evee, We will organize Ravi's birthday-party tomorrow
Root -organize
Direct Object -party
Action phrase- Ravi 's birthday - party
--------------------------------------------------------------------------------
----
Owners = ['Evee', 'Ravi']
================================================================================
====
Dialog -Evee, We will organize a welcome party for David
Root -organize
Direct Object -party
Action phrase- organize a welcome party
--------------------------------------------------------------------------------
----
Owners = ['Evee', 'David']
================================================================================
====
```

```
Dialog -Hey Evee, designs will be updated by Jack
updated False
--------------------------------------------------------------------------------
----
Owners = ['Hey Evee', 'Jack']
================================================================================
----
```