

# Phần 1

```
# Cài đặt spaCy
!pip install spacy

# Tải về mô hình tiếng Anh (kích thước trung bình, có đủ thông tin
# cho parsing)
!python -m spacy download en_core_web_md

Requirement already satisfied: spacy in c:\users\admin\anaconda3\lib\
site-packages (3.8.11)
Requirement already satisfied: spacy-legacy<3.1.0,>=3.0.11 in c:\\
users\admin\anaconda3\lib\site-packages (from spacy) (3.0.12)
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Requirement already satisfied: numpy>=1.19.0 in c:\\users\\admin\\
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site-packages (from spacy) (3.1.6)
Requirement already satisfied: setuptools in c:\\users\\admin\\anaconda3\\
lib\\site-packages (from spacy) (72.1.0)
Requirement already satisfied: packaging>=20.0 in c:\\users\\admin\\
anaconda3\\lib\\site-packages (from spacy) (24.2)
Requirement already satisfied: annotated-types>=0.6.0 in c:\\users\\
```

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=1.8.1,<3.0.0,>=1.7.4->spacy) (0.6.0)  
Requirement already satisfied: pydantic-core==2.27.1 in c:\users\  
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Requirement already satisfied: typing-extensions>=4.12.2 in c:\users\  
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(2.3.0)  
Requirement already satisfied: certifi>=2017.4.17 in c:\users\admin\  
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(2025.4.26)  
Requirement already satisfied: blis<1.4.0,>=1.3.0 in c:\users\admin\  
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Requirement already satisfied: cloudpathlib<1.0.0,>=0.7.0 in c:\users\admin\anaconda3\lib\site-packages (from weasel<0.5.0,>=0.4.2->spacy) (0.23.0)  
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Requirement already satisfied: MarkupSafe>=2.0 in c:\users\admin\anaconda3\lib\site-packages (from jinja2->spacy) (3.0.2)  
Collecting en-core-web-md==3.8.0  
    Downloading  
https://github.com/explosion/spacy-models/releases/download/en_core_web_md-3.8.0/en_core_web_md-3.8.0-py3-none-any.whl (33.5 MB)  
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eta 0:00:03          ----- 29.1/33.5 MB 1.6 MB/s
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eta 0:00:03          ----- 30.4/33.5 MB 1.6 MB/s
eta 0:00:02          ----- 30.9/33.5 MB 1.6 MB/s
eta 0:00:02          ----- 31.5/33.5 MB 1.6 MB/s
eta 0:00:02          ----- 31.7/33.5 MB 1.6 MB/s
eta 0:00:02          ----- 32.2/33.5 MB 1.6 MB/s
eta 0:00:01          ----- 32.5/33.5 MB 1.6 MB/s
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```

```
----- 33.5/33.5 MB 1.6 MB/s
eta 0:00:00
Installing collected packages: en-core-web-md
Successfully installed en-core-web-md-3.8.0
✓ Download and installation successful
You can now load the package via spacy.load('en_core_web_md')
```

## Phần 2

### 2.1

```
import spacy
from spacy import displacy

# Ta'i mô hình tiếng Anh đã cài đặt
# Sử dụng en_core_web_md vì nó chứa các vector từ và cây cú pháp đầy đủ
nlp = spacy.load("en_core_web_md")

# Câu ví dụ
text = "The quick brown fox jumps over the lazy dog."

# Phân tích câu với pipeline của spaCy
doc = nlp(text)
```

### 2.2

```
# Tùy chọn để hiển thị trong trình duyệt
# options = {"compact": True, "color": "blue", "font": "Source Sans Pro"}

# Kho'i chạy server tại http://127.0.0.1:5000
# Bạn có thể truy cập địa chỉ này trên trình duyệt để xem cây phụ thuộc
# Nhâ'n Ctrl+C trong terminal để dừng server
displacy.serve(doc, style="dep")

c:\Users\Admin\anaconda3\Lib\site-packages\spacy\displacy\
__init__.py:108: UserWarning: [W011] It looks like you're calling
displacy.serve from within a Jupyter notebook or a similar
environment. This likely means you're already running a local web
server, so there's no need to make displacy start another one.
Instead, you should be able to replace displacy.serve with
displacy.render to show the visualization.
    warnings.warn(Warnings.W011)

<IPython.core.display.HTML object>
```

```
Using the 'dep' visualizer
Serving on http://0.0.0.0:5000 ...
```

```
127.0.0.1 - - [04/Dec/2025 07:37:11] "GET / HTTP/1.1" 200 7538
127.0.0.1 - - [04/Dec/2025 07:37:11] "GET /favicon.ico HTTP/1.1" 200
7538
```

```
Shutting down server on port 5000.
```

- "jumps" là từ gốc của câu.
- "jumps" có các phụ thuộc là "fox" (nsubj) và "over" (prep)
- "fox" là head của các từ "The", "quick" và "brown"

## Phần 3

```
# Lấy một câu khác để phân tích
text = "Apple is looking at buying U.K. startup for $1 billion"
doc = nlp(text)

# In ra thông tin của từng token
print(f'{TEXT}:<12} | {DEP:<10} | {'HEAD TEXT':<12} | {'HEAD
POS':<8} | {'CHILDREN'}')
print("-" * 70)

for token in doc:
    # Trích xuất các thuộc tính
    children = [child.text for child in token.children]
    print(f'{token.text:<12} | {token.dep_:<10} |
{token.head.text:<12} | {token.head.pos_:<8} | {children}')


-----
```

TEXT	DEP	HEAD TEXT	HEAD POS	CHILDREN
Apple	nsubj	looking	VERB	[]
is	aux	looking	VERB	[]
looking	ROOT	looking	VERB	['Apple', 'is', 'at']
at	prep	looking	VERB	['buying']
buying	pcomp	at	ADP	['startup']
U.K.	compound	startup	NOUN	[]
startup	dobj	buying	VERB	['U.K.', 'for']
for	prep	startup	NOUN	['billion']
\$	quantmod	billion	NUM	[]
1	compound	billion	NUM	[]
billion	pobj	for	ADP	['\$', '1']

## Phần 4

### 4.1

```
text = "The cat chased the mouse and the dog watched them."
doc = nlp(text)

for token in doc:
    # Chi' tìm các động từ
    if token.pos_ == "VERB":
        verb = token.text
        subject = ""
        obj = ""

        # Tìm chu' ngữ (nsubj) và tên ngữ (dobj) trong các con cua
        # động từ
        for child in token.children:
            if child.dep_ == "nsubj":
                subject = child.text
            if child.dep_ == "dobj":
                obj = child.text
        if subject and obj:
            print(f"Found Triplet: ({subject}, {verb}, {obj})")

Found Triplet: (cat, chased, mouse)
Found Triplet: (dog, watched, them)
```

### 4.2

```
text = "The big, fluffy white cat is sleeping on the warm mat."
doc = nlp(text)

for token in doc:
    # Chi' tìm các danh từ
    if token.pos_ == "NOUN":
        adjectives = []
        # Tìm các tính từ bô' nghĩa (amod) trong các con cua danh từ
        for child in token.children:
            if child.dep_ == "amod":
                adjectives.append(child.text)

        if adjectives:
            print(f"Danh từ '{token.text}' được bô' nghĩa bởi các tính
từ: {adjectives}")

Danh từ 'cat' được bô' nghĩa bởi các tính từ: ['big', 'fluffy',
'white']
Danh từ 'mat' được bô' nghĩa bởi các tính từ: ['warm']
```

## Phần 5

```
sentences = [
    "Yesterday I set the house on fire",
    "Mom beat me almost half-dead",
    "Today Mom went up to the fields",
    "So I burned it again, all by myself",
    "The forest smells of smoke",
    "The stream turns pitch black",
    "My whole village burns down",
    "I'm sentenced to life in prison"
]
```

### Bài 1

```
def find_main_verb(sentence):
    doc = nlp(sentence)
    for token in doc:
        if token.dep_ == "ROOT" and token.pos_ == "VERB":
            return token.text
    return None

for sentence in sentences:
    print(f"Sentence: {sentence}")
    main_verb = find_main_verb(sentence)
    print(f"Main Verb: {main_verb}")
```

```
Sentence: Yesterday I set the house on fire
Main Verb: set
Sentence: Mom beat me almost half-dead
Main Verb: beat
Sentence: Today Mom went up to the fields
Main Verb: went
Sentence: So I burned it again, all by myself
Main Verb: burned
Sentence: The forest smells of smoke
Main Verb: smells
Sentence: The stream turns pitch black
Main Verb: turns
Sentence: My whole village burns down
Main Verb: burns
Sentence: I'm sentenced to life in prison
Main Verb: sentenced
```

### Bài 2

```
def get_noun_chunks(sentence):
    doc = nlp(sentence)
    noun_chunks = []
```

```

    for token in doc:
        # Check if token is a noun and not already part of a recorded
        noun_chunk
        if token.pos_ == "NOUN" and not any(token.i in chunk for chunk
in noun_chunks):
            chunk = [token.text]
            # Include modifiers (amod, det, compound)
            for child in token.children:
                if child.dep_ in ("amod", "det", "compound"):
                    chunk.insert(0, child.text)
            noun_chunks.append(chunk)
    return [" ".join(chunk) for chunk in noun_chunks]

for sentence in sentences:
    chunks = get_noun_chunks(sentence)
    print(f"Sentence: {sentence}")
    print(f"Noun Chunks: {chunks}")

Sentence: Yesterday I set the house on fire
Noun Chunks: ['Yesterday', 'the house', 'fire']
Sentence: Mom beat me almost half-dead
Noun Chunks: ['Mom']
Sentence: Today Mom went up to the fields
Noun Chunks: ['Today', 'the fields']

Sentence: So I burned it again, all by myself
Noun Chunks: []
Sentence: The forest smells of smoke
Noun Chunks: ['forest', 'smoke']
Sentence: The stream turns pitch black
Noun Chunks: ['The stream', 'pitch']
Sentence: My whole village burns down
Noun Chunks: ['whole village']
Sentence: I'm sentenced to life in prison
Noun Chunks: ['life', 'prison']

```

## Bài 3

```

def get_path_to_root(token):
    path = []
    current = token
    while current.head != current:
        path.append(current.text)
        current = current.head
    path.append("ROOT")
    return " -> ".join(path)

doc = nlp("The quick brown fox jumps over the lazy dog.")
for token in doc:
    path = get_path_to_root(token)

```

```
print(f"Token: {token.text}")
print(f"Path to ROOT: {path}")

Token: The
Path to ROOT: The -> fox -> ROOT
Token: quick
Path to ROOT: quick -> fox -> ROOT
Token: brown
Path to ROOT: brown -> fox -> ROOT
Token: fox
Path to ROOT: fox -> ROOT
Token: jumps
Path to ROOT: ROOT
Token: over
Path to ROOT: over -> ROOT
Token: the
Path to ROOT: the -> dog -> over -> ROOT
Token: lazy
Path to ROOT: lazy -> dog -> over -> ROOT
Token: dog
Path to ROOT: dog -> over -> ROOT
Token: .
Path to ROOT: . -> ROOT
```