1. **Given the text example below, show the following NLP operations’**

**Simple text: “**Barack Hussein Obama is an American politician who served as the [44th President of the United States](https://en.wikipedia.org/wiki/List_of_Presidents_of_the_United_States) from 2009 to 2017**”**

**Barack-1**

**Text Annotation**

**Barack-1:Barack**

**Lemma Annotation**

**Barack-1:Barack**

**Parts of speech tags**

**Barack-1:NNP**

**Named entity relation**

**Barack-1:PERSON**

**Hussein-2**

**Text Annotation**

**Hussein-2:Hussein**

**Lemma Annotation**

**Hussein-2:Hussein**

**Parts of speech tags**

**Hussein-2:NNP**

**Named entity relation**

**Hussein-2:PERSON**

**Obama-3**

**Text Annotation**

**Obama-3:Obama**

**Lemma Annotation**

**Obama-3:Obama**

**Parts of speech tags**

**Obama-3:NNP**

**Named entity relation**

**Obama-3:PERSON**

**is-4**

**Text Annotation**

**is-4:is**

**Lemma Annotation**

**is-4:be**

**Parts of speech tags**

**is-4:VBZ**

**Named entity relation**

**is-4:O**

**an-5**

**Text Annotation**

**an-5:an**

**Lemma Annotation**

**an-5:a**

**Parts of speech tags**

**an-5:DT**

**Named entity relation**

**an-5:O**

**American-6**

**Text Annotation**

**American-6:American**

**Lemma Annotation**

**American-6:american**

**Parts of speech tags**

**American-6:JJ**

**Named entity relation**

**American-6:MISC**

**politician-7**

**Text Annotation**

**politician-7:politician**

**Lemma Annotation**

**politician-7:politician**

**Parts of speech tags**

**politician-7:NN**

**Named entity relation**

**politician-7:O**

**who-8**

**Text Annotation**

**who-8:who**

**Lemma Annotation**

**who-8:who**

**Parts of speech tags**

**who-8:WP**

**Named entity relation**

**who-8:O**

**served-9**

**Text Annotation**

**served-9:served**

**Lemma Annotation**

**served-9:serve**

**Parts of speech tags**

**served-9:VBD**

**Named entity relation**

**served-9:O**

**as-10**

**Text Annotation**

**as-10:as**

**Lemma Annotation**

**as-10:as**

**Parts of speech tags**

**as-10:IN**

**Named entity relation**

**as-10:O**

**the-11**

**Text Annotation**

**the-11:the**

**Lemma Annotation**

**the-11:the**

**Parts of speech tags**

**the-11:DT**

**Named entity relation**

**the-11:O**

**44th-12**

**Text Annotation**

**44th-12:44th**

**Lemma Annotation**

**44th-12:44th**

**Parts of speech tags**

**44th-12:JJ**

**Named entity relation**

**44th-12:ORDINAL**

**President-13**

**Text Annotation**

**President-13:President**

**Lemma Annotation**

**President-13:president**

**Parts of speech tags**

**President-13:NN**

**Named entity relation**

**President-13:O**

**of-14**

**Text Annotation**

**of-14:of**

**Lemma Annotation**

**of-14:of**

**Parts of speech tags**

**of-14:IN**

**Named entity relation**

**of-14:O**

**the-15**

**Text Annotation**

**the-15:the**

**Lemma Annotation**

**the-15:the**

**Parts of speech tags**

**the-15:DT**

**Named entity relation**

**the-15:O**

**United-16**

**Text Annotation**

**United-16:United**

**Lemma Annotation**

**United-16:United**

**Parts of speech tags**

**United-16:NNP**

**Named entity relation**

**United-16:LOCATION**

**States-17**

**Text Annotation**

**States-17:States**

**Lemma Annotation**

**States-17:States**

**Parts of speech tags**

**States-17:NNPS**

**Named entity relation**

**States-17:LOCATION**

**from-18**

**Text Annotation**

**from-18:from**

**Lemma Annotation**

**from-18:from**

**Parts of speech tags**

**from-18:IN**

**Named entity relation**

**from-18:O**

**2009-19**

**Text Annotation**

**2009-19:2009**

**Lemma Annotation**

**2009-19:2009**

**Parts of speech tags**

**2009-19:CD**

**Named entity relation**

**2009-19:DATE**

**to-20**

**Text Annotation**

**to-20:to**

**Lemma Annotation**

**to-20:to**

**Parts of speech tags**

**to-20:TO**

**Named entity relation**

**to-20:DATE**

**2017-21**

**Text Annotation**

**2017-21:2017**

**Lemma Annotation**

**2017-21:2017**

**Parts of speech tags**

**2017-21:CD**

**Named entity relation**

**2017-21:DATE**

**.-22**

**Text Annotation**

**.-22:.**

**Lemma Annotation**

**.-22:.**

**Parts of speech tags**

**.-22:.**

**Named entity relation**

**.-22:O**

**parsing**

**(ROOT (S (NP (NNP Barack) (NNP Hussein) (NNP Obama)) (VP (VBZ is) (NP (NP (DT an) (JJ American) (NN politician)) (SBAR (WHNP (WP who)) (S (VP (VBD served) (PP (IN as) (NP (NP (DT the) (JJ 44th) (NN President)) (PP (IN of) (NP (DT the) (NNP United) (NNPS States))))) (PP (IN from) (NP (CD 2009) (TO to) (CD 2017)))))))) (. .)))**

**-> politician/NN (root)**

**-> Obama/NNP (nsubj)**

**-> Barack/NNP (compound)**

**-> Hussein/NNP (compound)**

**-> is/VBZ (cop)**

**-> an/DT (det)**

**-> American/JJ (amod)**

**-> served/VBD (acl:relcl)**

**-> who/WP (nsubj)**

**-> President/NN (nmod:as)**

**-> as/IN (case)**

**-> the/DT (det)**

**-> 44th/JJ (amod)**

**-> States/NNPS (nmod:of)**

**-> of/IN (case)**

**-> the/DT (det)**

**-> United/NNP (compound)**

**-> 2017/CD (nmod:from)**

**-> from/IN (case)**

**-> 2009/CD (nummod)**

**-> to/TO (dep)**

**-> ./. (punct)**

**Core reference resoultion**

**[CHAIN1-["Barack Hussein Obama" in sentence 1, "an American politician who served as the 44th President of the United States from 2009 to 2017" in sentence 1, "He" in sentence 2], CHAIN2-["44th" in sentence 1], CHAIN4-["the 44th President of the United States" in sentence 1], CHAIN5-["the United States" in sentence 1], CHAIN6-["2009 to 2017" in sentence 1], CHAIN7-["African American" in sentence 2], CHAIN9-["the first African American to have served as president" in sentence 2]]**

1. **Draw a knowledge graph for the given data.**

Travels

places

Price

Division

Type

Announced

Division

Type

Changes