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

**Simple text: “”**

**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.**

<Traveling to>

<to>

<increase Price>

<Has Name>

<has Division>

<has Division>

<of>

<has Announced>

<has name>

<Changes in>