CS321: Computer Networks
Tutorial 3

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Q1 How many IP prefixes does the Internet have? How many unique ASes?

We can check for the number of unique prefixes and number of unique ASes by iterating on the file row by row and putting the values in a set and then finding the length of the set.

```
Number of Prefixes: 525483
Number of Unique ASes: 34
```

Q2 An institute (referred to as Insti-A henceforth) owns four /24s in the range 103.21.124.0 - 103.21.127.255. List all the routing table entries (prefixes and corresponding AS paths) that correspond to Insti-A in the routing table.

We can check for all prefixes (by iterating in the file) that end with /24 and out of all such prefixes if one lies in the range 103.21.124.0 - 103.21.127.255 then we can append it to a list and print in the end.

Find the list of all table routing corresponding to insti-A entries **at the end of this pdf**.

PS: A better-formatted version of the table can be found **here**.

Q3 From the AS path information above, figure out how many ISPs Insti-A buys network service from. Write down their AS numbers, and names.

The last number in the AS path is the destination. So, if we iterate backwards, the first number that is different from the destination is the ASN of the ISP.

We find the number of unique ISPs from all the AS paths and then find the name of the ISP using either whois or bgpview API.

```
Number of ISPs of Inst A: 3

ASN        ISP Name
55410      VIL-AS-AP
4755       TATACOMM-AS
55824      NKN-CORE-NW
```

Q4 Find out the top 10 ASes that have the highest degree in the routing table. Look up their names from whois. Can you guess what these ASes are from their names?

For each AS in the AR Path, we add the next AS it is connected to in the graph (a set) then, in the end, we calculate the degree for each of the AS and sort it in descending order.

Here are the top 10 ASes with the highest degree in the routing table:

```
AS         Name

174        COGENT-174
3356       LEVEL3
6939       HURRICANE
7018       ATT-INTERNET4
4323       CENTURYLINK-LEGACY-TWTC
209        CENTURYLINK-US-LEGACY-QWEST
701        UUNET
6461       ZAYO-6461
3549       LVLT-3549
9002       RETN-AS
```

These ASes look like either ISPs or a really large organization.

Table for Q2:

```
Number of Routing tables enties for Inst A: 130

Routing table entries for Inst A:

Prefixes              AS Path

103.21.124.0/24       11537 7660 7660 7660 24287 24490 55824 132423

103.21.124.0/24       8492 9002 15412 18101 9885 55824 132423

103.21.124.0/24       3561 1299 15412 18101 9885 55824 132423

103.21.124.0/24       1239 1299 15412 18101 9885 55824 132423

103.21.124.0/24       293 3257 15412 18101 9885 55824 132423

103.21.124.0/24       701 1299 15412 18101 9885 55824 132423

103.21.124.0/24       2914 15412 18101 9885 55824 132423

103.21.124.0/24       1668 3257 15412 18101 9885 55824 132423

103.21.124.0/24       37100 6453 15412 18101 9885 55824 132423

103.21.124.0/24       13030 15412 18101 9885 55824 132423

103.21.124.0/24       1299 15412 18101 9885 55824 132423

103.21.124.0/24       3257 15412 18101 9885 55824 132423

103.21.124.0/24       3130 2914 15412 18101 9885 55824 132423

103.21.124.0/24       7660 24287 24490 55824 132423

103.21.124.0/24       40191 3257 15412 18101 9885 55824 132423

103.21.124.0/24       2152 2153 11537 7660 7660 7660 24287 24490 55824 132423

103.21.124.0/24       5413 15412 18101 9885 55824 132423

103.21.124.0/24       3741 15412 18101 9885 55824 132423
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103.21.124.0/24      3356 15412 15412 15412 15412 18101 9885 55824 132423

103.21.124.0/24      852 1299 15412 18101 9885 55824 132423

103.21.124.0/24      1221 4637 15412 18101 9885 55824 132423

103.21.124.0/24      6762 15412 18101 9885 55824 132423

103.21.124.0/24      11686 19782 11537 7660 7660 7660 24287 24490 55824 132423

103.21.124.0/24      3549 3356 15412 15412 15412 15412 18101 9885 55824 132423

103.21.124.0/24      22652 3257 15412 18101 9885 55824 132423

103.21.124.0/24      6939 15412 18101 9885 55824 132423

103.21.124.0/24      6539 577 2914 15412 18101 9885 55824 132423

103.21.124.0/24      286 15412 18101 9885 55824 132423

103.21.124.0/24      3549 3356 15412 15412 15412 15412 18101 9885 55824 132423

103.21.124.0/24      7018 2914 15412 18101 9885 55824 132423

103.21.124.0/24      3130 2914 15412 18101 9885 55824 132423

103.21.124.0/24      3303 15412 18101 9885 55824 132423

103.21.124.0/24      2497 15412 18101 9885 55824 132423

103.21.125.0/24      11537 7660 7660 7660 24287 24490 55824 132423

103.21.125.0/24      8492 9002 15412 18101 9885 55824 132423

103.21.125.0/24      3561 1299 15412 18101 9885 55824 132423

103.21.125.0/24      1239 1299 15412 18101 9885 55824 132423

103.21.125.0/24      293 3257 15412 18101 9885 55824 132423

103.21.125.0/24      701 1299 15412 18101 9885 55824 132423

103.21.125.0/24      2914 15412 18101 9885 55824 132423
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103.21.125.0/24       1668 3257 15412 18101 9885 55824 132423

103.21.125.0/24       37100 6453 15412 18101 9885 55824 132423

103.21.125.0/24       13030 15412 18101 9885 55824 132423

103.21.125.0/24       1299 15412 18101 9885 55824 132423

103.21.125.0/24       3257 15412 18101 9885 55824 132423

103.21.125.0/24       3130 2914 15412 18101 9885 55824 132423

103.21.125.0/24       7660 24287 24490 55824 132423

103.21.125.0/24       40191 3257 15412 18101 9885 55824 132423

103.21.125.0/24       2152 2153 11537 7660 7660 7660 24287 24490 55824 132423

103.21.125.0/24       5413 15412 18101 9885 55824 132423

103.21.125.0/24       3741 15412 18101 9885 55824 132423

103.21.125.0/24       3356 15412 15412 15412 15412 18101 9885 55824 132423

103.21.125.0/24       852 1299 15412 18101 9885 55824 132423

103.21.125.0/24       1221 4637 15412 18101 9885 55824 132423

103.21.125.0/24       6762 15412 18101 9885 55824 132423

103.21.125.0/24       11686 19782 11537 7660 7660 7660 24287 24490 55824 132423

103.21.125.0/24       3549 3356 15412 15412 15412 15412 18101 9885 55824 132423

103.21.125.0/24       22652 3257 15412 18101 9885 55824 132423

103.21.125.0/24       6939 15412 18101 9885 55824 132423

103.21.125.0/24       6539 577 2914 15412 18101 9885 55824 132423

103.21.125.0/24       286 15412 18101 9885 55824 132423

103.21.125.0/24       3549 3356 15412 15412 15412 15412 18101 9885 55824 132423
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103.21.125.0/24      7018 2914 15412 18101 9885 55824 132423

103.21.125.0/24      3130 2914 15412 18101 9885 55824 132423

103.21.125.0/24      3303 15412 18101 9885 55824 132423

103.21.125.0/24      2497 15412 18101 9885 55824 132423

103.21.126.0/24      8492 3209 3209 55410 132423 132423 132423 132423 132423
132423

103.21.126.0/24      3561 209 3491 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      1239 3356 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      1668 3356 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      2914 15412 18101 9885 9498 55410 132423 132423 132423 132423
132423 132423

103.21.126.0/24      293 3491 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      701 3356 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      37100 3356 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      3303 1273 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      6539 577 3491 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      3741 3209 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      11686 3356 55410 132423 132423 132423 132423 132423 132423

103.21.126.0/24      2152 11164 3491 55410 132423 132423 132423 132423 132423
132423

103.21.126.0/24      3130 1239 3356 55410 132423 132423 132423 132423 132423
132423

103.21.126.0/24      6762 3356 55410 132423 132423 132423 132423 132423 132423
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103.21.126.0/24      1221 4637 3356 55410 132423 132423 132423 132423 132423
132423
103.21.126.0/24      22652 3356 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      7660 4635 1273 55410 132423 132423 132423 132423 132423
132423
103.21.126.0/24      5413 3209 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      3356 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      2497 3491 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      3257 15412 18101 9885 9498 55410 132423 132423 132423 132423
132423 132423
103.21.126.0/24      852 3491 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      3549 3491 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      3130 1239 3356 55410 132423 132423 132423 132423 132423
132423
103.21.126.0/24      40191 174 3491 55410 132423 132423 132423 132423 132423
132423
103.21.126.0/24      7018 3491 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      286 3356 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      6939 3491 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      13030 1273 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      1299 1273 55410 132423 132423 132423 132423 132423 132423
103.21.126.0/24      3549 3491 55410 132423 132423 132423 132423 132423 132423
103.21.127.0/24      8492 9002 6453 4755 132423
103.21.127.0/24      1239 6453 4755 132423
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103.21.127.0/24        3561 6453 4755 132423

103.21.127.0/24        293 6453 4755 132423

103.21.127.0/24        701 6453 4755 132423

103.21.127.0/24        1668 6453 4755 132423

103.21.127.0/24        2914 6453 6453 4755 132423

103.21.127.0/24        37100 6453 4755 132423

103.21.127.0/24        2152 3356 6453 4755 132423

103.21.127.0/24        852 6453 4755 132423

103.21.127.0/24        3303 6453 4755 132423

103.21.127.0/24        22652 6453 4755 132423

103.21.127.0/24        6539 577 6453 4755 132423

103.21.127.0/24        5413 1299 6453 4755 132423

103.21.127.0/24        3741 3356 6453 4755 132423

103.21.127.0/24        1221 4637 6453 4755 132423

103.21.127.0/24        2497 6453 4755 132423

103.21.127.0/24        7660 4635 6453 4755 132423

103.21.127.0/24        6762 6453 4755 132423

103.21.127.0/24        11686 3356 6453 4755 132423

103.21.127.0/24        3549 6453 4755 132423

103.21.127.0/24        3130 1239 6453 4755 132423

103.21.127.0/24        3356 6453 4755 132423

103.21.127.0/24        3257 6453 4755 132423
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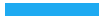
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103.21.127.0/24     3130 1239 6453 4755 132423

103.21.127.0/24     13030 3549 6453 4755 132423

103.21.127.0/24     286 6453 4755 132423

103.21.127.0/24     7018 6453 4755 132423

103.21.127.0/24     3549 6453 4755 132423

103.21.127.0/24     1299 6453 4755 132423

103.21.127.0/24     6939 1299 6453 4755 132423

103.21.127.0/24     40191 3257 6453 4755 132423
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