Consider the following BGP announcements where each number on the path (separated by a vertical bar “|”) is the autonomous system number identifying the network.
The path is read from left to right with the last AS being the destination. Each path is accompanied by a routed prefix.

3356 | 6363 | 7262 1.2.3.0/24
1299 | 7777 | 7262 1.2.0.0/16
3356 | 1212 | 7262 1.0.0.0/8
2222 | 3333 | 3322 2.3.4.0/24

Q1. Which ASes will be traversed by a packet destined towards
1.1 **1.2.3.122 ->** Take the first path ; traverses ASes 3356, 6363, 7262
1.2 1.2.4.200
1.3 1.200.0.0
1.4 2.3.4.250

Q2. How many IP addresses are routed towards AS 7262 in the above table?
Only the first three paths reference prefixes that are destined towards AS7262
1.2.3.0/24; 1.2.0.0/16; 1.0.0.0/8
256 ; 65,536 ; **16,777,216**

1.2.3.0/24 is a *subset* of the IP addresses routed by prefix 1.2.0.0/16, which is itself a *subset* of the IP addresses routed by prefix 1.0.0.0/8.

2^(32-pfix_length)
2^8

Q3. Given a randomly selected IP address destination in AS**7262**'s address space, determine the probability each of the following ASes will be traversed:

3356 (16,711,936/**16,777,216**) - **6363**

(256/**16,777,216**) - **7262 1.0**
1299 7777 1212
3333 0.0 2222 0.0 3322 0.0

Probability: #routed IPs traversing that AS under longest-prefix matching

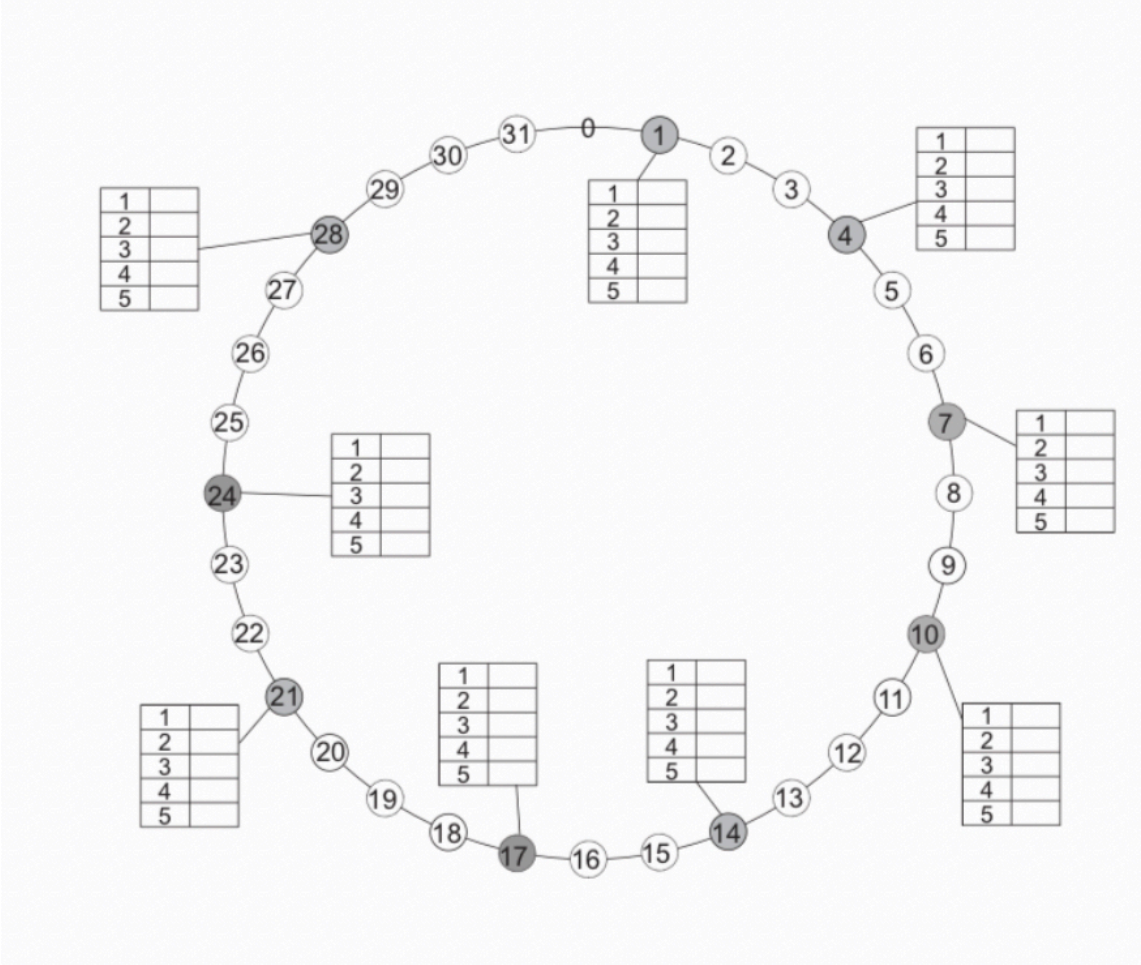
---

#routed IPs towards AS7262 (**16,777,216**)

AS3356 will not be traversed if an IP address falls in the second prefix but not the first prefix
We have to remove the IP address space referenced by the /16 from those that will traverse AS3356; and then re-add those in the /24 that will traverse AS3356.
Numerator: 2^24 - 2^16 + 2^8 = **16,711,936**
(the /8) (the /16) (the /24)

****

Determine the queries sent on this Chord ring for each of the following opeartions:



From node 4 to key 23

4 -> 21 -> 24

i_eth Finger table entry = NODE_ID + 2^i

1. 4 + 2^0 = 4 +1 =5
2. 4 + 2^1 = 4 + 2 = 6
3. 4 + 4 = 8
4. 4 + 8 = 12
5. 4 + 16 = 20

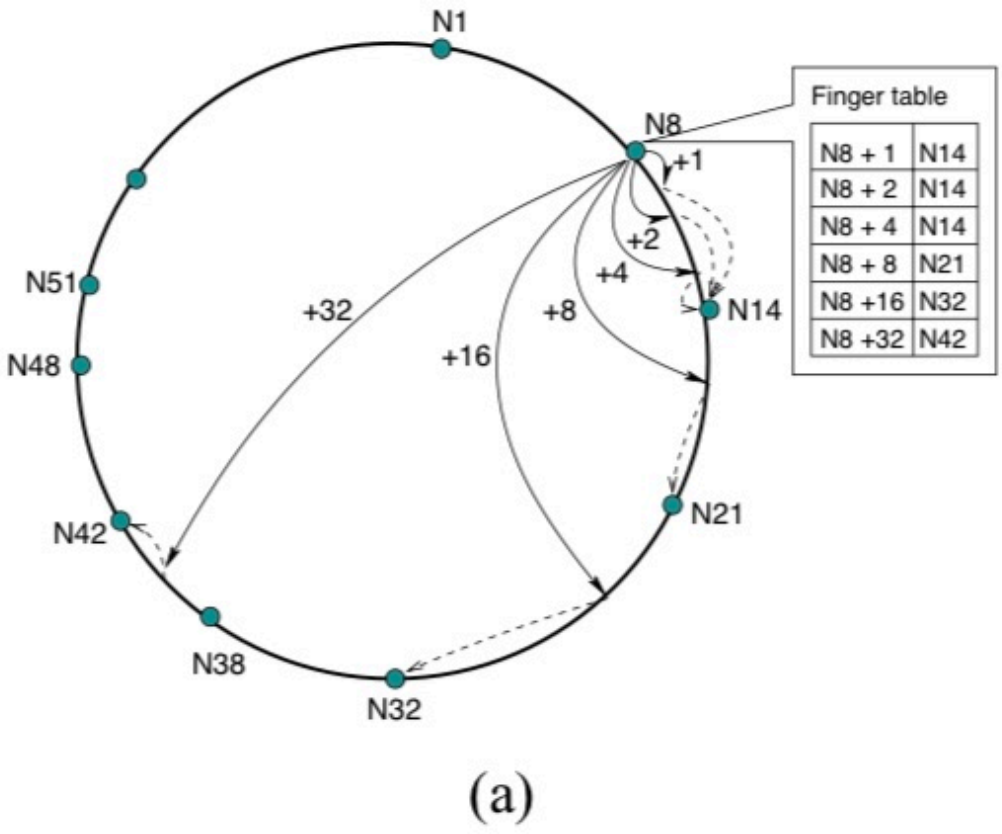
Finger table at node 4:
1. 7 [successor(5)]
2. 7 [successor(6)]
3. 10 [successor(8)]
4. 14 [successor(12)]
5. 21 [successor(20)]

Finger table at node 21:
1. 24 [successor(22)]
2. 24 [successor(23)]
3. 28 [successor(25)]
4. 1 [successor(29)]
5. 7 [successor(37 greater than 31 => 5)]

Further Qs
From node 4 to key 16

From node 17 to key 0
From node 17 to key 13
From node 21 to key 12
From node 21 to key 15

Chord finger table:



(a)

****

Consider that a bank has two branch offices: Branch 1 is in Los Angeles (represented by P_1), Branch 2 is in Seattle (represented by P_2). **NOTE: the relative priority of concurrent transactions is based on the process ID!**. The **non-symmetric** one-way propagation delay between these branches are defined in this table:

From ↓ To →	Los Angeles	Seattle
Los Angeles	0	25ms
Seattle	20ms	0

Imagine that each branch can issue a single type of transaction (e.g. a deposit into an account) represented as T_i. Consider this sequence of transactions:

1. Los Angeles (P_1) issues T_1 at t=0ms
2. Seattle (P_2) issues T_2 at t=30ms
3. Los Angeles (P_1) issues T_3 at t=35ms

What is the first transaction to execute?
T1, T2, T3, The execution order is non-deterministic

t = 0; LA[(T1,1.1)] SEA []

t = 25; LA[(T1,1.1)] SEA[(T1,1.1)]

SEA sends ACK_T1 (arrives at t = 45)

t = 30 SEA sends T2, arrives to LA at time t=50
LA[(T1,1.1)] SEA[(T2,2.2)]

t = 35 LA sends T3, (which will arrive in SEA at time t=60)
LA[(T1,1.1)] [(T3,2.1)] SEA[(T2,2.2)]

…

What is the second transaction to execute? (It's **T3**)

What is the third transaction to execute?

At what time does T1 execute in Los Angeles?

At what time does T2 execute in Seattle?