DYNAMICALLY ALLOCATING NETWORK ADDRESSES

CROSS REFERENCE TO RELATED APPLICATION

[0001] The following application claims priority to, and the benefit of, U.S. Patent Application entitled "DYNAMICALLY ALLOCATING NETWORK ADDRESSES" filed on September 18, 2012 having application number 13/621,891, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] Network devices may be associated with one or more network addresses per network interface. Network addresses facilitate routing of data to and from network devices. Internet protocol (IP) network addresses are associated with subnet masks, which indicate the portion of the network address that corresponds to a routing prefix and the portion of the network address that corresponds to a host identifier for a subnet. A subnet is a logically visible subdivision of an IP network. Subnets may be arranged logically in a hierarchical architecture, thereby partitioning network address space into a tree-like routing structure. Network address exhaustion is a potential problem for IP version 4, given that the network addresses are just 32 bits in length. IP version 6 uses 128-bit addresses and thus is not as easily susceptible to address exhaustion. Nonetheless, in spite of the address exhaustion issues, IP version 4 remains in common use.

SUMMARY OF INVENTION

[0002a] According to a first aspect of the present invention, there is provided a system, comprising: at least one computing device; and an address allocation service executable by the at least one computing device, the address allocation service being configured to: initially assign a first network address allocation to a subdivision of a network, the subdivision including a plurality of computing devices; configure a router for the subdivision to implement the first network address allocation; obtain data indicating a reconfiguration of the plurality of computing devices;, wherein the reconfiguration changes a quantity of virtualized machine instances hosted by the plurality of computing devices;

~~subsequently~~ dynamically assign a second network address allocation to the subdivision of the network based at least in part on the reconfiguration of the plurality of computing devices; and reconfigure the router for the subdivision to implement the second network address allocation.

[0002b] According to a second aspect of the present invention, there is provided a method, comprising: obtaining, by at least one computing device, data indicating a reconfiguration of at least one of a plurality of computing devices included in a subdivision of a network, the subdivision being assigned a network address allocation~~;~~, wherein the reconfiguration changes a quantity of virtualized machine instances hosted by the at least one of the plurality of computing devices; determining, by the at least one computing device, whether to release an assignment of a first subset of the network address allocation based at least in part on the reconfiguration of the at least one of the plurality of computing devices; dynamically releasing, by the at least one computing device, the assignment of the first subset of the network address allocation in response to the determining; and reconfiguring, by the at least one computing device, a router for the subdivision to advertise a second subset of the network address allocation instead of the network address allocation.

[0002c] According to a third aspect of the present invention, there is provided a non-transitory computer-readable medium embodying a program executable in at least one computing device, wherein when executed the program causes the at least one computing device to at least: initially assign a first network address allocation to a subdivision of a network including a plurality of computing devices based at least in part on a respective computing device type for individual ones of the plurality of computing devices; configure a router for the subdivision to implement the first network address allocation; obtain data indicating a reconfiguration of the plurality of computing devices to host an increased quantity of virtualized machine instances; dynamically assign a second network address allocation to the subdivision of the network based at least in part on the reconfiguration of the plurality of computing devices; reconfigure the router for the subdivision to implement the second network address allocation; obtain data indicating a subsequent reconfiguration of the plurality of computing devices included in the subdivision to host a reduced quantity of virtualized machine instances;

release a third network address allocation assigned to the subdivision based at least in part on the subsequent reconfiguration of the plurality of computing devices; and reconfigure the router for the subdivision to exclude advertising of the third network address allocation.

[0002d] According to a fourth aspect of the present invention, there is provided a system, comprising: at least one computing device; and at least one service executable in the at least one computing device, wherein when executed the at least one service causes the at least one computing device to at least: determine that a quantity of virtualized machine instances executed on a plurality of computing devices has changed; dynamically assign an updated network address allocation to a subdivision of a network in response to the quantity of virtualized machine instances, the subdivision including the plurality of computing devices; and reconfigure a router for the subdivision to implement the updated network address allocation.

[0002e] According to a fifth aspect of the present invention, there is provided a system, comprising: at least one computing device; and at least one service executable in the at least one computing device, wherein when executed the at least one service causes the at least one computing device to at least: determine that a quantity of virtualized machine instances hosted by a computing device included in a subdivision of a network has changed, the subdivision being assigned a network address allocation; dynamically release an assignment of a first subset of the network address allocation in response to the quantity of virtualized machine instances; and reconfigure a router for the subdivision to advertise a second subset of the network address allocation instead of the network address allocation.

[0002f] According to a sixth aspect of the present invention, there is provided a method, comprising: determining, by at least one computing device, that a quantity of virtualized machine instances executed on a plurality of computing devices has changed; dynamically assigning, by the at least one computing device, an updated network address allocation to a subdivision of a network in response to the quantity of virtualized machine instances, the subdivision including the plurality of computing devices; and reconfiguring, by the at least one computing device, a router for the subdivision to implement the updated network address allocation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] Many aspects of the present disclosure can be better understood with reference to the following drawings. The components in the drawings are not necessarily to scale, with emphasis instead being placed upon clearly illustrating the principles of the disclosure. Moreover, in the drawings, like reference numerals designate corresponding parts throughout the several views.

[0004] FIG. 1 is a drawing of a networked environment according to various embodiments of the present disclosure.

[0005] FIG. 2 is a drawing of one example of a hosted computing environment employed in the networked environment of FIG. 1 according to various embodiments of the present disclosure.

CLAIMS

Therefore, the following is claimed:

1. A system, comprising:

at least one computing device; and

an address allocation service executable by the at least one computing device, the address allocation service being configured to:

initially assign a first network address allocation to a subdivision of a network, the subdivision including a plurality of computing devices;

configure a router for the subdivision to implement the first network address allocation;

obtain data indicating a reconfiguration of the plurality of computing devices;, wherein the reconfiguration changes a quantity of virtualized machine instances hosted by the plurality of computing devices;

~~subsequently~~ dynamically assign a second network address allocation to the subdivision of the network based at least in part on the reconfiguration of the plurality of computing devices; and

reconfigure the router for the subdivision to implement the second network address allocation.

2. The system of claim 1, wherein the second network address allocation is ~~subsequently~~ dynamically assigned based at least in part on an increased quantity of virtualized machine instances hosted by the plurality of computing devices pursuant to the reconfiguration of the plurality of computing devices.

3. The system of claim 1, wherein the second network address allocation is ~~subsequently~~ dynamically assigned based at least in part on a network address assignment velocity associated with the plurality of computing devices.

4. The system of claim 1, wherein the first network address allocation is based at least in part on a respective computing device type for ~~each~~ individual ones of the plurality of computing devices.

5. The system of claim 1, wherein the address allocation service is further configured to:

predict ~~a~~ the quantity of virtualized machine instances for at least one of the plurality of computing devices based at least in part on the respective computing device type; and

wherein the first network address allocation is based at least in part on the quantity of virtualized machine instances that is predicted.

6. The system of claim 1, wherein the subdivision corresponds to a rack, and the router corresponds to a rack-associated router.

7. The system of claim 1, wherein the second network address allocation is selected based at least in part on contiguity of the second network address allocation with the first network address allocation.

8. The system of claim 1, wherein the first network address allocation and the second network address allocation are assigned to the subdivision in response to the second network address allocation being implemented.

9. The system of claim 1, wherein the first network address allocation is no longer assigned to the subdivision in response to the second network address allocation being implemented.

10. The system of claim 1, wherein the second network address allocation includes the first network address allocation.

11. The system of claim 1, wherein the plurality of computing devices include a plurality of virtualized machine instances which employ a variable quantity of network addresses.

12. The system of claim 8, wherein the first network address allocation and the second network address allocation are contiguous.

13. The system of claim 8, wherein the first network address allocation and the second network address allocation are non-contiguous.

14. The system of claim 13, wherein, in response to the second network address allocation being implemented, the router is configured to advertise a contiguous network address allocation that includes the first network address allocation, the second network address allocation, and a third network address allocation that is contiguous to the first network address allocation and the second network address allocation and is unassigned to the subdivision.

~~14~~15. A method, comprising:

obtaining, by at least one computing device, data indicating a reconfiguration of at least one of a plurality of computing devices included in a subdivision of a network, the subdivision being assigned a network address allocation~~;~~, wherein the reconfiguration changes a quantity of virtualized machine instances hosted by the at least one of the plurality of computing devices;

determining, by the at least one computing device, whether to release an assignment of a first subset of the network address allocation based at least in part on the reconfiguration of the at least one of the plurality of computing devices;

dynamically releasing, by the at least one computing device, the assignment of the first subset of the network address allocation in response to the determining; and

reconfiguring, by the at least one computing device, a router for the subdivision to advertise a second subset of the network address allocation instead of the network address allocation.

~~12~~16. The method of claim ~~11~~15, wherein the reconfiguration corresponds to a reduction in ~~a~~ the quantity of virtualized machine instances hosted by the at least one of the plurality of computing devices.

~~13~~17. The method of claim ~~12~~16, further comprising determining, by the at least one computing device, whether the quantity of virtualized machine instances meets a threshold for releasing the first subset of the network address allocation.

~~14~~18. The method of claim ~~11~~15, further comprising automatically reconfiguring, by the at least one computing device, one of the plurality of computing devices in the subdivision to use a first network address in the first subset of the network address allocation instead of a second network

address in the second subset of the network address allocation before automatically reconfiguring the router.

~~15~~19. The method of claim ~~14~~15, further comprising:

obtaining, in the at least one computing device, data indicating a subsequent reconfiguration of at least one of the plurality of computing devices included in the subdivision;

assigning, in the at least one computing device, another network address allocation to the subdivision based at least in part on the subsequent reconfiguration of the at least one of the plurality of computing devices; and

automatically reconfiguring, in the at least one computing device, the router for the subdivision to advertise the other network address allocation in addition to the second subset of the network address allocation.

20. The method of claim 15, wherein the first subset of the network address allocation and the second subset of the network address allocation are contiguous.

21. The method of claim 15, wherein the first subset of the network address allocation and the second subset of the network address allocation are not contiguous.

22. A non-transitory computer-readable medium embodying a program executable in at least one computing device, wherein when executed the program causes the at least one computing device to at least:

initially assign a first network address allocation to a subdivision of a network including a plurality of computing devices based at least in part on a respective computing device type for individual ones of the plurality of computing devices;

configure a router for the subdivision to implement the first network address allocation;

obtain data indicating a reconfiguration of the plurality of computing devices to host an increased quantity of virtualized machine instances;

dynamically assign a second network address allocation to the subdivision of the network based at least in part on the reconfiguration of the plurality of computing devices;

reconfigure the router for the subdivision to implement the second network address allocation;

obtain data indicating a subsequent reconfiguration of the plurality of computing devices included in the subdivision to host a reduced quantity of virtualized machine instances;

release a third network address allocation assigned to the subdivision based at least in part on the subsequent reconfiguration of the plurality of computing devices; and

reconfigure the router for the subdivision to exclude advertising of the third network address allocation.

23. The non-transitory computer-readable medium of claim 22, wherein when executed the program further causes the at least one computing device to at least reconfigure one of the plurality of computing devices to use a different network address in response to the third network address allocation being released.

24. The non-transitory computer-readable medium of claim 22, wherein the third network address allocation is a subset of the first network address allocation or the second network address allocation.

25. A system, comprising:

at least one computing device; and

at least one service executable in the at least one computing device, wherein when executed the at least one service causes the at least one computing device to at least:

determine that a quantity of virtualized machine instances executed on a plurality of computing devices has changed;

dynamically assign an updated network address allocation to a subdivision of a network in response to the quantity of virtualized machine instances, the subdivision including the plurality of computing devices; and

reconfigure a router for the subdivision to implement the updated network address allocation.

26. The system of claim 25, wherein the quantity of virtualized machine instances has been increased relative to a previous quantity of virtualized machine instances hosted by the plurality of computing devices.

27. The system of claim 25, wherein the quantity of virtualized machine instances employ a variable quantity of network addresses.

28. The system of claim 25, wherein, in response to the updated network address allocation being implemented, the router is configured to advertise a contiguous network address allocation that includes the updated network address allocation and another network address allocation that is contiguous to the updated network address allocation and is unassigned to the subdivision.

29. The system of claim 25, wherein when executed the at least one service further causes the at least one computing device to at least:

determine a network address assignment velocity associated with the plurality of computing devices; and

determine the updated network address allocation based at least in part on the network address assignment velocity.

30. The system of claim 25, wherein when executed the at least one service further causes the at least one computing device to at least:

determine a respective computing device type associated with each of the plurality of computing devices; and

determine the updated network address allocation based at least in part on the respective computing device type associated with each of the plurality of computing devices.

31. The system of claim 25, wherein when executed the at least one service further causes the at least one computing device to at least determine the updated network address allocation based at least in part on contiguity of the updated network address allocation with a previous network address allocation.

32. The system of claim 25, wherein the subdivision corresponds to a rack, and the router corresponds to a rack-associated router.

33. A system, comprising:

at least one computing device; and

at least one service executable in the at least one computing device, wherein when executed the at least one service causes the at least one computing device to at least:

determine that a quantity of virtualized machine instances hosted by a computing device included in a subdivision of a network has changed, the subdivision being assigned a network address allocation;

dynamically release an assignment of a first subset of the network address allocation in response to the quantity of virtualized machine instances; and

reconfigure a router for the subdivision to advertise a second subset of the network address allocation instead of the network address allocation.

34. The system of claim 33, wherein the quantity of virtualized machine instances has been reduced relative to a previous quantity of virtualized machine instances hosted by the computing device.

35. The system of claim 33, wherein when executed the at least one service further causes the at least one computing device to at least determine that the quantity of virtualized machine instances meets a threshold for releasing the first subset of the network address allocation.

36. The system of claim 33, wherein when executed the at least one service further causes the at least one computing device to at least reconfigure the computing device in the subdivision to use a first network address in the second subset of the network address allocation instead of a second network address in the first subset of the network address allocation before reconfiguring the router.

37. The system of claim 33, wherein when executed the at least one service further causes the at least one computing device to at least:

determine that the quantity of virtualized machine instances has changed again;

assign another network address allocation to the subdivision in response to the quantity of virtualized machine instances that has changed again; and

reconfigure the router for the subdivision to advertise the other network address allocation in addition to the second subset of the network address allocation.

38. A method, comprising:

determining, by at least one computing device, that a quantity of virtualized machine instances executed on a plurality of computing devices has changed;

dynamically assigning, by the at least one computing device, an updated network address allocation to a subdivision of a network in response to the quantity of virtualized machine instances, the subdivision including the plurality of computing devices; and

reconfiguring, by the at least one computing device, a router for the subdivision to implement the updated network address allocation.

39. The method of claim 38, wherein, in response to the updated network address allocation being implemented, the router is configured to advertise a contiguous network address allocation that includes the updated network address allocation and another network address allocation that is contiguous to the updated network address allocation and is unassigned to the subdivision.

40. The method of claim 38, wherein the quantity of virtualized machine instances employ a variable quantity of network addresses.

41. The method of claim 38, further comprising:

determining, by the at least one computing device, a network address assignment velocity associated with the plurality of computing devices; and

determining, by the at least one computing device, the updated network address allocation based at least in part on the network address assignment velocity.

42. The method of claim 38, further comprising:

determining, by the at least one computing device, a respective computing device type associated with each of the plurality of computing devices; and

determining, by the at least one computing device, the updated network address allocation based at least in part on the respective computing device type associated with each of the plurality of computing devices.

43. The method of claim 38, further comprising determining, by the at least one computing device, the updated network address allocation based at least in part on contiguity of the updated network address allocation with a previous network address allocation.

44. The method of claim 38, wherein the subdivision corresponds to a rack, and the router corresponds to a rack-associated router.