

Skill 13.01 Exercise 1

Amazon describes their web services platform like this:

Amazon Web Services (AWS) is a highly reliable, scalable, low-cost infrastructure platform in the cloud that powers hundreds of thousands of enterprise, start-up and public sector business with organizations in over 190 countries around the world.

What does it mean for the platform to be scalable?

- (a) It is relatively inexpensive for high amounts of usage.
- (b) It can process requests for users located anywhere in the world.
- (c) It continues operating when experiencing traffic surges.
- (d) It is distributed across multiple data centers.

Skill 13.02 Exercise 1

Which of the following aspects of the Internet has most increased its scalability?

- (a) Networking hardware requires raw materials that must be mined out of the earth, such as copper and tin.
- (b) Any computing device can connect to the Internet as long as it follows the open Internet protocols.
- (c) A government can use hardware or software to restrict the Internet communications coming into the country.
- (d) A message sent over the Internet on a wired Ethernet connection depends on electricity.

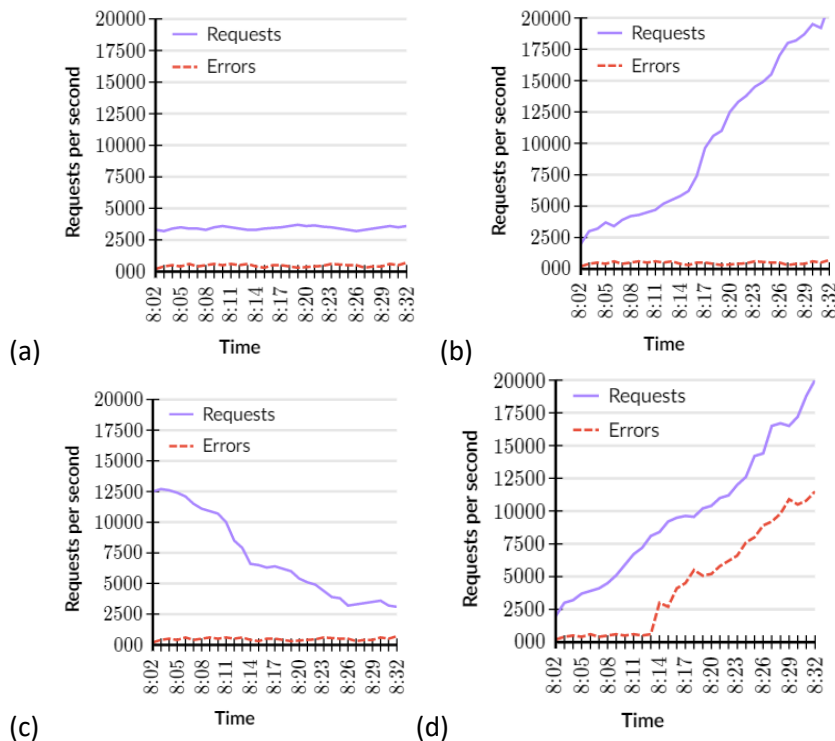
Skill 13.03 Exercise 1

IPv4 is the first standardized version of the Internet Protocol. IPv4 is gradually being replaced by IPv6, a more scalable version of the protocol. Which feature of IPv4 makes it a less scalable system?

- (a) IPv4 systems can use Network Address Translation (NAT) to allow a single IP address to represent multiple devices. Typically a router's IP address is used for transfer over the Internet, and then the router can send the data to one of the devices connected to it with the use of internal IP addresses.
- (b) Each IPv4 address is a 32-bit number. That's enough space for 2^{32} , (4.3×10^9) possible addresses for Internet-connected computing devices (less than the current number of Internet-connected devices).
- (c) IPv4 includes a checksum field in the header to enable routers to make sure the header was not corrupted (maliciously or accidentally) in transport.
- (d) Each IP packet header includes (optional) options fields that can be used by different Internet applications to change the way packets are routed or handled at the destination.

Skill 13.04 Exercise 1

When a website is endorsed by celebrity on social media, the website often experiences a surge in users. Which of these charts represents a website scaling well to handle a surge in users? *The purple line shows all the requests sent to the website servers, while the red dashed line shows which of the requests resulted in a server error.*

**Skill 13.05 Exercise 1**

Every year during the Christmas holiday, Google hosts a website to help track the path of Santa around the globe. The website goes from zero traffic to millions of visitors in a small period of time. Before the website goes live, site reliability engineers (SREs) are in charge of making sure that the Santa tracking website will be able to withstand the spike in traffic. Which of these strategies is the best way to verify that the Santa tracking website is scalable?

- (a) The SREs can use common hacking techniques to try to breach the website's database and uncover security holes
- (b) The SREs can use Google-owned machines to simulate large amounts of visitors on the website and monitor the website to see how it reacts
- (c) The SREs can preview the website at multiple screen sizes on multiple types of devices to ensure it looks current in all shapes and sizes
- (d) The SREs can write tests to make sure that the site correctly reports the current location of Santa at all times.

AP Computer Science Principles

Ticket Out the Door

Set 13: Scalable Systems
