**Chapter 2 questions**

**1: What are the different types of application architecture?**

The different types of application architecture are:

(FitzGerald, J. p. 29)

Host-based architecture – The server (or host computer) performs virtually all the work

Client-based architecture – The client computers perform most of the work

Client-server architecture – The work is shared between the servers and clients

Cloud-based architecture – The cloud provides the services to the client

**4: What is middleware, and what does it do?**

(FitzGerald, J. p. 31)

Middleware is software which sits between the application software on the client and the application software on the server.

Middleware does two things:

Provides a standard way of communicating that can translate between software from different vendors

To manage the message transfer from clients to servers so that client’s need not know the specific server that contains the application’s data

**5: Suppose your organization was contemplating switching from a host-based architecture to client-server. What problems would you foresee?**

There are a multitude of problems which I am able to foresee if the organization which I was working for was going to switch from a host-based architecture to client-server architecture:

Figuring out which will be doing what processing (Presentation logic, application logic, service logic, data access logic, data storage) (FitzGerald, J. p. 30)

Having software from different vendors working together properly (FitzGerald, J. p. 31) – Can use middleware

Changing infrastructure to make sure it supports client-server instead of host-based

Planning on and implementing the changes (scheduling)

Security of the server and of the clients

**7: Compare and contrast two-tier, three-tier, and n-tier client-server architectures. What are the technical differences, and what advantages and disadvantages does each offer?**

(FitzGerald, J. p. 31)

Two-tier architecture

The server is responsible for the data and the client

Only uses two sets of computers, one set of clients and one set of servers

Three-tier architecture

Uses three sets of computers

Software on the client computer is responsible for presentation logic, an application server is responsible for the services logic and application logic, and a separate database server is responsible for the data access logic and data storage

N-tier architecture –

Uses more than three sets of computers

Client is responsible for presentation logic, a database server is responsible for the data access logic and data storage, and the services logic and application logic are spread across two or more different sets of servers

(FitzGerald, J. p. 32)

Primary advantage of an n-tier client-server architecture compared with a two-tier architecture (or a three-tier compared with a two-tier) is that it separates the processing that occurs to better balance the load on the different servers; it is more scalable.

Two primary disadvantages to an n-tier architecture compared with a two-tier architecture (or a three-tier with a two-tier) is that it puts greater load on the network, and secondly is that it is much more difficult to program and test software in n-tier architectures than in two-tier architectures because more devices have to communicate to complete a user’s transaction

**10: Compare and contrast the three cloud computing models.**

(FitzGerald, J. p. 34 & 35)

Software as a Service (SaaS) –

An organization outsources the entire application to the cloud provider and uses it as any other application that is available via a browser

Based on multitenancy

The customers can customize the app and doesn’t have to worry about upgrades, security, or underlying infrastructure because the cloud provider does it all

Platform as a Service (PaaS) –

What if there is an application you need but no cloud provider offers on you like?

You can build your own application and manage your own data on the cloud infrastructure provided by your cloud supplier

The developers in your organization decide what programming language to use to develop the application of choice

The needed hardware and software infrastructure, called the platform, is rented from the cloud provider

Offers much faster development and deployment of custom applications at a fraction of the cost required for the traditional client-server architecture

Infrastructure as a Service (IaaS) –

The cloud provider manages the hardware, including servers, storage, and networking components

The organization is responsible for all the software, including operating system, database software, and its applications and data

Sometimes referred to as Hardware as a Service (HaaS)

Only the hardware is provided in this model

**14: Can a mail sender use a two-tier architecture to send mail to a receiver using a three-tier architecture? Explain.**

(FitzGerald, J. p. 44)

Yes, all communication is standardized using SMTP between the different mail servers, how the user interacts with their mail servers is unimportant

**15: Describe how mail user agents and mail transfer agents work together to transfer mail messages.**

(FitzGerald, J. p. 41)

Mail user agent –

More commonly called a email client

The user creates the email message using one of these email clients, which formats the message into an SMTP packet that includes information such as the sender’s address and the destination address, then sends the SMTP packet to a mail server which runs the mail transfer agent

Mail transfer agent –

More commonly called mail server software

Reads the SMTP packet to finds the destination address and then sends the packet on its way through the network

Mail transfer agent on destination server stores the message in the receiver’s inbox

This means that the mail user agent, or email client,

**16: What roles do SMTP, POP, and IMAP play in sending and receiving email on the Internet?**

(FitzGerald, J. p. 41)

SMTP –

Simple mail transfer protocol

Most commonly used email standard simply because it is the email standard used on the Internet

Usually implemented as a two-tier thick client-server application, but not always

POP –

Post office protocol

Used to communicate between the receiver’s email client and his/her mail server

Before a user can read a mail message with a POP email client, the email message must be copied to the client computer’s hard disk and deleted from the mail server

IMAP –

Internet message access protocol

Used to communicate between the receiver’s email client and his/her mail server

Email message can be stored on the mail server after they are read

**18: What is Telnet, and why is it useful?**

(FitzGerald, J. p. 46)

Telnet enables users to log in to servers (or other clients). It requires an application layer program on the client computer and an application layer program on the server or host computer. Must use account name and password to log in.

**22: Some experts argue that thin-client client-server architectures are really host-based architectures in disguise and suffer from the same old problems. Do you agree? Explain.**

I disagree, older host-based architecture does not have as much application logic as thin-clients today, however, still much less than thick clients. Thin-clients today are also more likely to be centralized, the thin-client is still more likely than not to be getting their data from multiple servers, compared to in the past where it would have been more likely to be an individual very large host. This demonstrates that they are similar, however, they have small important details that are different, which also shows that they don’t have the same problems from the past.

References:

FitzGerald, J., Dennis, A., & Durcikova, A. (2021). Business data communications and networking (Fourteenth). Wiley.

I pledge that on all academic work that I submit, I will neither give nor receive unauthorized aid, nor will I present another person's work as my own.

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