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Week 1 Application: Hierarchical Architectural Arrangements in Systems Design

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Hierarchical arrangements are those where by the entire structure is in the shape of a pyramid. The lower components report to upper components, until there is one component remaining. In systems analysis and design, these portions would be made up of programmatic modules, whereby, each successive step down the pyramid is more finely detailed and closer to the programming base layer than the last. Such hierarchical arrangements lend themselves to some system architectures, while others tend to flounder or are simply incompatible with this setup.

Two types of system architectures that work exceedingly well in a hierarchical arrangement are Client/Server Architectures and Centralized Architectures. The client/server setup is one where the entire system is split into two, clients and servers (Satzinger, Jackson, & Burd, Systems Analysis and Design in a Changing World, 2009, p. 342). In this sense, the server sits on top, distributing data per requests from the clients below. There is a single server, or server cluster, which services multiple clients, creating an intrinsic hierarchical architecture.

Centralized Architecture has a hierarchy built into its setup by default. All clients connect to a centralized server, or mainframe, thereby defaulting in a hierarchical setup (Satzinger, Jackson, & Burd, Systems Analysis and Design in a Changing World, 2009, p. 341). Meaning, this is similar to a client/server setup. The applications within the server/mainframe would need to have a command structure whereby the clients would be given distributed access to the varying components of the application. This command component could simply be a protocol, but nevertheless, would sit above the rest of the structure creating an application hierarchy, as well as hardware.

Two types of systems which would not work well in a hierarchical arrangement are Multitier Architecture and Web Services Architecture. A multitier system is one where the differing component applications are distributed on various pieces of hardware (Satzinger, Jackson, & Burd, Systems Analysis and Design in a Changing World, 2009, p. 340). This means that there is no single component that sits above any others. One could make the argument that the protocol connecting the components sits above the rest. However, the systems therein interconnect horizontally, as well as vertically. Meaning there is no clear pattern identifying a hierarchy within.

Web services architectures mimic multitier architectures similarly to how centralized setups mirror client/server setups. Also, the web service is related to a client/server model. However, unlike a pure client server model, the different system connections can be spread across a range of hardware and software platforms (Satzinger, Jackson, & Burd, Systems Analysis and Design in a Changing World, 2009, p. 347). This leaves little correlation with a hierarchy intact. Especially if one considers that there may be horizontal connections within the model, thus destroying any chance of a hierarchy. For instance, two clients connect to each other and then also connect to the same web service.

As shown, hierarchies can exist within a system in both application and hardware. However, this does not always prove possible for all systems. Client/server and centralized architectures nearly have a hierarchy by default. On the other hand, one would assume multitier and web services architectures to be hierarchical, but with horizontal connections, this cannot be the case. In any sense, the purpose of laying out such models is in organizing the system for controlled development, hopefully, without any errors.

Reference

Satzinger, J. W., Jackson, R. B., & Burd, S. D. (2009). *Systems Analysis and Design in a Changing World* (5th ed.). Boston: Cengage Learning.

Satzinger, J. W., Jackson, R. B., & Burd, S. D. (2012). *Systems Analysis and Design in a Changing World* (6th ed.). Boston: Cengage Learning.