

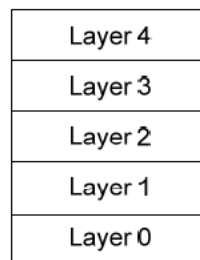
## SOFE 2720 Class Activity – Architectural Design

### Learning Objective

This activity emphasizes the use of a common architectural layered architecture in the design of a software system. The software architecture of a program or computing system is the structure or structures of the system, which comprise software components, the externally visible properties of those components, and the relationships among them.

### Exercises

A common architectural style is a layered architecture as shown and described below.



**Name:** Layered Style

**Application:** Structure a program into an array of cohesive modules with well-defined interfaces to realize levels of abstraction, increase changeability, and increase reusability.

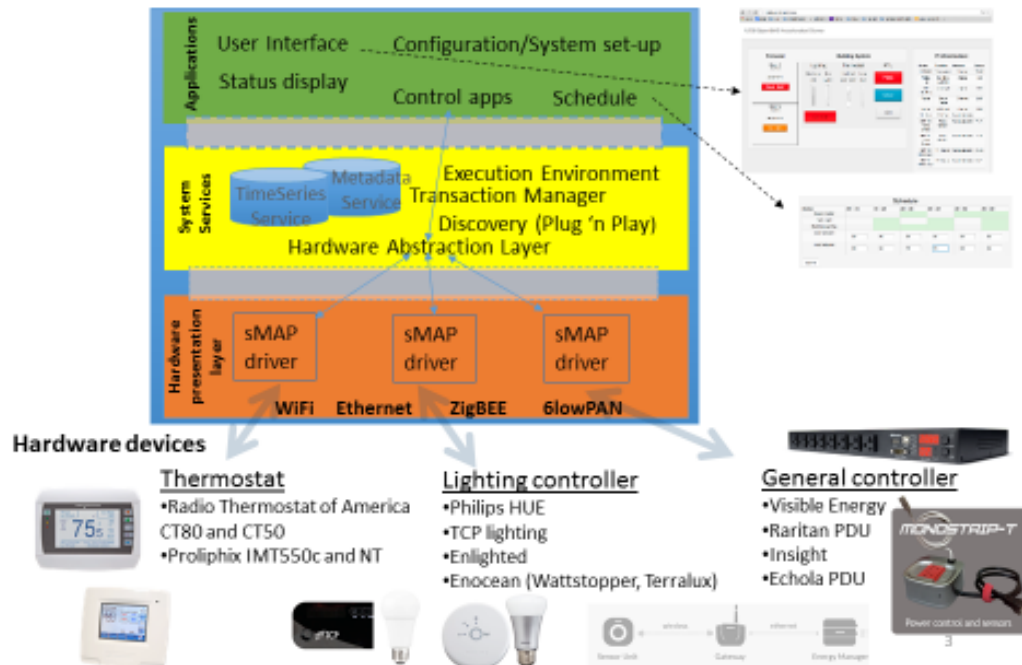
**Form:** The program is partitioned into cohesive modules with well defined interfaces arranged in a chain or sequence from highest to lowest: the layers. Each layer is allowed to use only the layer immediately below it (Strict Layered style), or all the layers below it (Relaxed Layered style).

**Consequences:** Layers should be cohesive, hide information, be simple, and be coupled only to the layer or layers beneath them. All these characteristics make layers easy to alter or replace, improving changeability. The simplicity of a Layered architecture increases reliability and maintainability. Layers are likely to form reusable components.

Layered programs may be hard to debug; program behavior must often be realized with communications across several layers, which may cause performance problems and be more work to program. It may be hard to form a good collection of layers.

There are a few layered architectures that are proposed for home automation systems. There is one example listed below and another discussed at <https://www.embedded-computing.com/guest-blogs/layered-architecture-delivers-more-reliable-automotive-applications-faster>.

What is common is that they consist of a upper user interface layer, a middle logic or business layer, and a lower interface layer to sensors.



The XBOS layered architecture, consisting of Hardware devices, a Hardware Presentation Layer, System Services layer, and an Application layer [1]

1. For the Caldera software system define components at the different layer of the XBOS architecture that would address the functional requirements of the system. Hint: Use the Analysis Classes that you derived in the previous exercises to help you decide on potential components.
2. Create associations between the components (i.e. which components interact with each other)
3. Create a table that lists each component and its responsibility.