**SOFTWARE ENGINEERING**

**Term Project**

**SMART BUILDING SYSTEM FOR UNIVERSITIES (SBSU)**

Third Iteration: Architectural Model

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# Introduction

In this report, we will write architectural model of our system. Also we will write why we choose layer architecture. We will write this report refer to this architectural partitioning in the project plan while arranging the division of labor between our developers.

This report includes:

**Subsystems:** Each component that the main system will use

**Architectural Model Schema:** Subsystems and their relationships between them.

**Block Diagram:** Block Diagram of architectural

**Dictionary:** Explanations of some entities where necessary.

# Subsystem Model

Air Conditioning

Heating

Lighting

<system>  
Security System

<system>  
Resource Control System

<system>  
Attendance System

<system>  
Smart Building System

<system>  
Fire Alarm System

<system>  
Communication, Data Network

<system>  
Audio/Video System

**Figure 1 – Block Diagram of Subsystems**

1. **Attendance System** provides attendance of students to courses.
2. **Security System** checks users entering the building and blocking unauthorized users to enter the building.
3. **Resource Control System** includes Lighting, Heating and Air Conditioning Systems. This system is responsible to control and to provide working of these systems.
4. **Inventory Tracking System** tracks status, quantities of materials that are in classes and laboratories.
5. **Fire Alarm System** detects fire and warns people inside of buildings in fire case.
6. **Communication, Data Network** provides communication and data transmission between sensors, gadgets and database.
7. **Audio Video System** provides using of Smart Boards and Projectors.

# Architectural Model

## Why did not we choose other possible candidate architectures for our system?

1. **Client/Server Architecture:** Distributing process is not our main concern. We do not use our system on internet so much. We design intranet and one main server is enough for us.
2. **MVC Pattern:** Our system is pretty easy to be modeled. Interactions handling is also straightforward. MVC makes our system more complex than how it should be.
3. **Repository Architecture:** Our subsystems do not have their own databases. We do not need one specific data model.
4. **Pipe and Filter Architecture:** Our system is an interactive system. Pipe filter architecture is not fit to interactive systems.

## Our Architectural Model

### What is Layered Architecture?

Layered architecture is a software architecture that uses many layers for allocating the different responsibilities of a software product. It used to model the interfacing of sub-systems. Also it supports the incremental development of sub-systems in different layers. When a layer interface changes, only the adjacent layer is affected. The layered style is used to decompose a system into cohesive layers, where layers can only communicate with the layer below it and does not have knowledge of the layers

“above" it.

### Why Do We Use Layered Architecture?

Subsystems in layers might be developed incrementally so developments’ responsibilities may be divided for members in our team. Our system is an interactive system. Therefore, layered architecture makes it easy. Data that we get from physical environment are easy to be processed, be stored on database and represented to users by using layered architecture.

### Block Diagram of Our Layered Architecture

**  
Figure 2 – Block Diagram of Subsystems**

USER INTERFACE

DATA CENTER (Sensor DB, Human DB)

Lighting Sensor

Lecturer

Heating Sensor

Smart Board

Fingerprint Scanner

Internet

Wireless Network

Intranet

Wired Networks

The ***sensing layer***is responsible for capturing information from the field, which will be then used to support the decision making and coordination activities.

The ***communication layer*** is responsible for providing interaction capability to components participating in the first response process. Because there is no universal network interface, this layer is implemented as a set of heterogeneous solutions, hopefully linked through communication bridges.

The ***information persistence layer***is responsible to store and share the supporting information, allowing participants to coordinate their activities and make better and timely decisions.

The ***application layer***is responsible for providing a direct and useful service to the end-users.

# Reference Model

We have employed Event Processing System as an application architecture.

## What is Event Processing System?

Event Processing System is applications where system actions depend on interpreting events from the system’s environment.

## Why do we use Event Processing Model?

In our system have multiple environment fields. These fields have their own events/actions. Our systems’ data center stores information from events.

# Dictionary

Gadget: a ​small ​device or ​machine with a ​particular ​purpose

Sensor: a piece of equipment that can find heat, light, etc