K. J. Somaiya College of Engineering, Mumbai-77

Batch:	Roll No.:
Experiment / assignment / tutorial No. 3	

TITLE : Identifying the Architectural Style of any B2B Software Applications

AIM: To visualize the architectural style of existing proprietary software based on the features of the application

Expected OUTCOME of Experiment:

CO 1. To design the architecture of software systems in various architectural styles and patterns**.**

Books/ Journals/ Websites referred:

1 "Software Architecture, Richard N Taylor etl, Wiley

2 www.google.com

Theory:

Definition

An architectural style is a named collection of architectural design decisions that are applicable in a given development context constrain architectural design decisions that are specific to a particular system within that context elicit beneficial qualities in each resulting system.

Benefits of Using Styles:

1. Design reuse

Well-understood solutions applied to new problems

2. Code reuse

Shared implementations of invariant aspects of a style

3. Understand ability of system organization

A phrase such as "client-server" conveys a lot of information

4. Interoperability

Supported by Style standardization

5. Style-specific analyses

Enabled by the constrained design space

6. Visualizations

Style-specific depictions matching engineers' mental models

Style Analysis Dimensions:

1. What is the design vocabulary? Component and connector types
2. What are the allowable structural patterns?
3. What is the underlying computational model?
4. What are the essential invariants of the style?
5. What are common examples of its use?
6. What are the (dis)advantages of using the style?
7. What are the style's specializations?

Some Common Styles:

- **Traditional, language-influenced styles**
  - Main program and subroutines
  - Object-oriented
- **Layered**
  - Virtual machines
  - Client-server
- **Data-flow styles**
  - Batch sequential
  - Pipe and filter
- **Shared memory**
  - Blackboard
  - Rule based
- **Interpreter**
  - Interpreter
  - Mobile code
- **Implicit invocation**
  - Event-based
  - Publish-subscribe
- **Peer-to-peer**
- **"Derived" styles**
  - C2
  - CORBA

Proprietary S/W Application Name :
Visual Vibration Analysis & Predictive maintenance software

Software Application Design decisions:

1) Separate processing of data from IOT device to server

Adding processors behind every camera would be more costly, more prone to wear and tear. Processing the same code everywhere would be difficult to change. Instead keep a separate server that takes in all the data and processes it together.

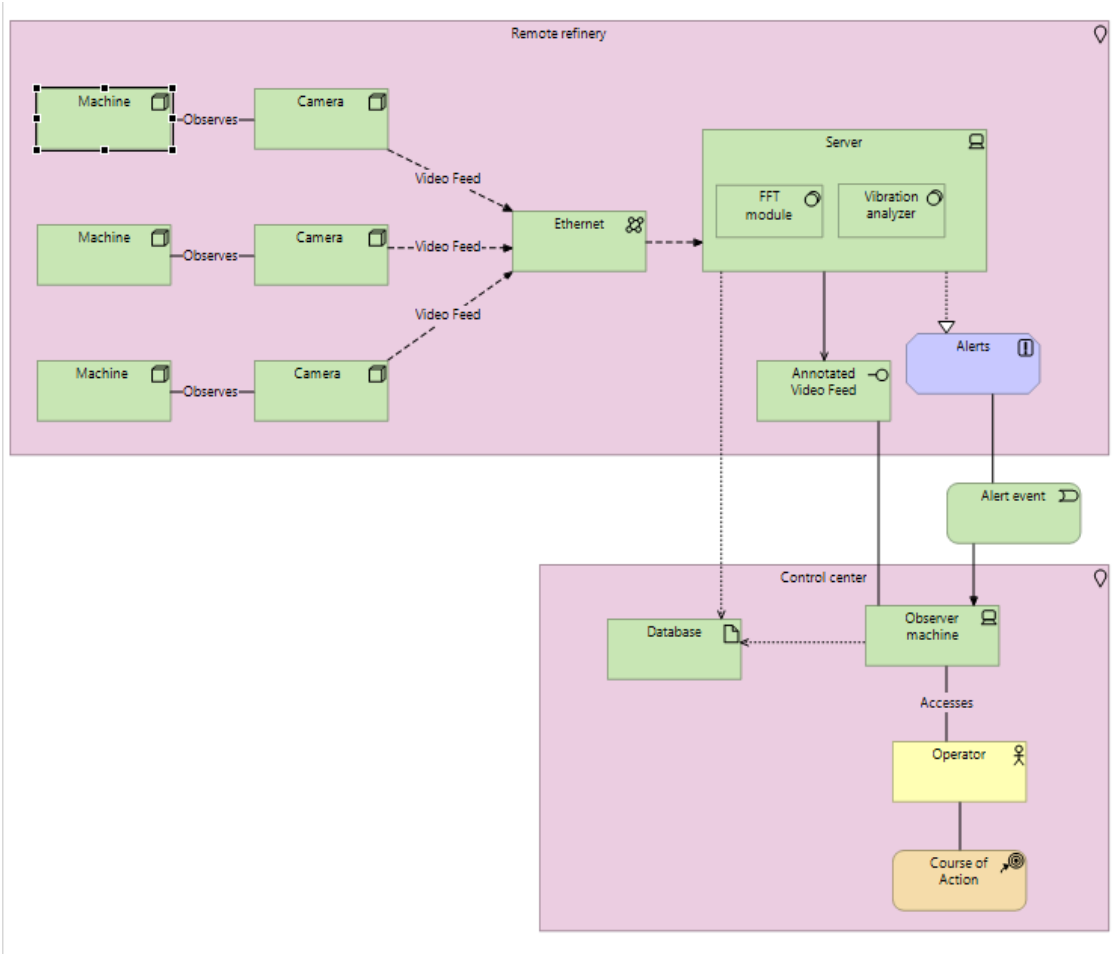
2) Separate the location of the server and the observers.

The observers machines must be kept at different locations and enable remote access to the server machine. This will help offshore refineries as they won't have to maintain personnel over there.

3) Maintain a database of past events.

The database of the past events would be helpful to analyze and monitor past events as well as predict future events based on past output.

Architectural Model:



Architectural Styles Identified & Why that style:

1) Client and Server style

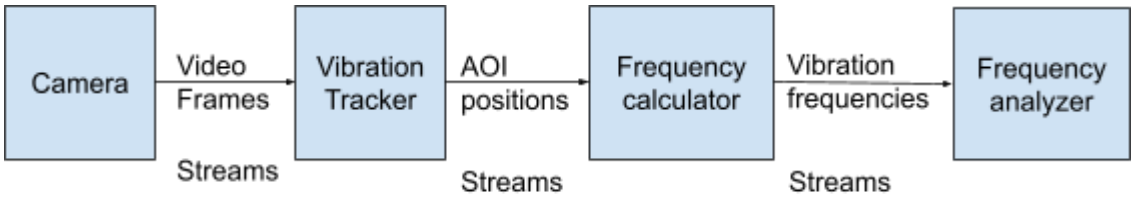
The client machine is located in the main control center where the client machine request for the data that is provided to them by the server machine located at the offshore refinery. The client machine does not do any processing of the video frames. However it has to process the events and the vibration frequencies for further analysis of the vibration and predictive maintenance.

This system is used in order to separate the locations of the control room and the refinery.

2) Pipe and Filter style

Processing is done on video feed with various pipes

pipe 1 - video frames
pipe 2- positions of AOIs
pipe 3- frequencies



3) Publisher subscriber style

Alerts are announced by the server. Those who have interest in the announcement may subscribe to the application and get alerts. They may be mobile systems (through SMS), or desktop applications, or IOT alarms in the control room.

4) Event based systems

Every vibration alert is treat as an event and is sent to various devices.

Explain the components and connectors of for the selected application
Ans:
Components:

1. Server Machine
2. Client machines
3. IoT video cameras
4. Database server

Connectors:

1. Pipe and filter connectors through ethernet cables
2. Data request from client to server through HTTP
3. Data transfer to database through web protocols

Post Lab Descriptive Questions

1. **Discuss the merits and demerits of the style of the selected application.**

Ans:

Merits -

1) Separation of concerns
2) Separation of locations
3) Data and alerts can be accessed from anywhere.

Demerits -

1) Any delay may cause the entire system to go out of sync
2) All load on single server - single point of failure.

Date: 16-08-24 **Signature of faculty in-charge**