# Week 7 – Class Discussion Evidence

## Event-Based Processing

1. What are the differences between time, request, and event-driven interactions?  
- Time-driven: Interactions happen at regular intervals, such as a temperature sensor sending data every 5 seconds regardless of change.  
- Request-driven: A system waits for a specific request (e.g., API call) before responding or processing data.  
- Event-driven: Reactions occur when a specific event happens (e.g., motion detected, button pressed), enabling more efficient and real-time responses.

2. What are the motivations and benefits of using event-based processing for IoT?  
- It reduces unnecessary communication and saves power, which is crucial for battery-powered IoT devices.  
- It allows for faster response times, better scalability, and real-time processing of dynamic environments like smart homes or industrial automation.

3. What are the challenges of event-based processing for IoT?  
- Handling massive volumes of asynchronous events can become complex.  
- Ensuring reliability and accuracy in detecting and responding to events is challenging.  
- Debugging event-driven systems is more difficult due to non-linear flows and concurrency issues.

## Complex Event Processing (CEP)

4. Why do we use Complex Event Processing (CEP)?  
- CEP allows systems to identify meaningful patterns from multiple events over time and react to them intelligently.  
- It is used to detect trends, anomalies, or sequences of events that indicate higher-level situations (e.g., detecting fraud in real-time or monitoring health conditions from sensor streams).

5. What is the relationship between MQTT and CEP?  
- MQTT is a lightweight messaging protocol that delivers IoT data efficiently from devices to servers.  
- CEP consumes these MQTT messages to analyze, combine, and detect complex patterns across the data in real time.  
- Together, they form a powerful system for smart decision-making in IoT environments.

6. What are the roles of real-time data enrichment, time-series statistical processing, machine learning, and data preparation in CEP?  
- Real-time data enrichment: Adds context to raw events (e.g., adding location info to sensor data).  
- Time-series statistical processing: Helps detect trends, anomalies, or periodic behaviors.  
- Machine learning: Improves decision-making by predicting events or classifying patterns.  
- Data preparation: Cleans and transforms raw data into formats that CEP engines can use effectively.

✅ This discussion improved my understanding of how event-based systems provide responsive, energy-efficient solutions for IoT, and how CEP adds intelligence on top of raw events to drive real-time actions.