

# CSE 4316 Architectural Design Exercise

Problem: A customer has approached your employer, a mobile app and cloud service development company, for help designing a new product. Your employer has tasked you with creating a system architecture for the project, which the customer must approve before development funds are made available. The customer has provided a preliminary product concept that must be reflected in your system architecture.

Product Concept: The customer, an electric wheelchair manufacturer, wishes to develop a web-based system for monitoring usage information from all of its wheelchairs in the field. Each wheelchair is currently equipped with Platform Measurement Module (PMM) that records wheel speeds, battery life, user commands, etc. The PMM includes a Bluetooth interface and communication API that you will use to retrieve all necessary data streams from the wheelchair platform.

The customer wants a mobile app developed that will run on the user's tablet or phone, collect information that the PMM periodically publishes, perform some filtering of the PMM data, and publish the filtered data to a cloud service. The cloud service will maintain PMM data for all wheelchairs in a database, which may then be accessed at a later date by the original user's mobile device or by the wheelchair manufacture's technical support portal (TSP) .

The mobile application will provide high-level usage statistics to the wheelchair user on request, such as the total miles traveled, average miles traveled per battery charge, etc. These queries will be performed and displayed via the GUI menu.

The TSP will allow real-time monitoring of individual wheelchairs in the system, as well as fleet-wide statistics (number of wheelchairs in motion, number of wheelchairs being charged, etc). The TSP reports will be accessed by the manufacturer support staff through a web browser.

Design Guidelines: Your architecture must meet, **at a minimum**, the following guidelines

- A minimum of 3 top-level systems must be used
- Each system must include at least 2 subsystems
- All subsystems must have at least 1 source or sink represented as a dataflow line
- All dataflow lines must include arrows on one or both ends to denote directionality
- All systems and subsystems must be named
- All dataflow lines must be labeled to show the type of information being exchanged
- At least one database must be used and represented with the proper symbol

Complete the initial dataflow diagram for this system architecture. You do not need to formally document each subsystem, but your dataflow diagram should be structured and labeled such that all subsystems and communication lines have a clear purpose. Use appropriate diagramming software, such as Microsoft Visio or OpenOffice Draw to prepare your diagram.