Team T02

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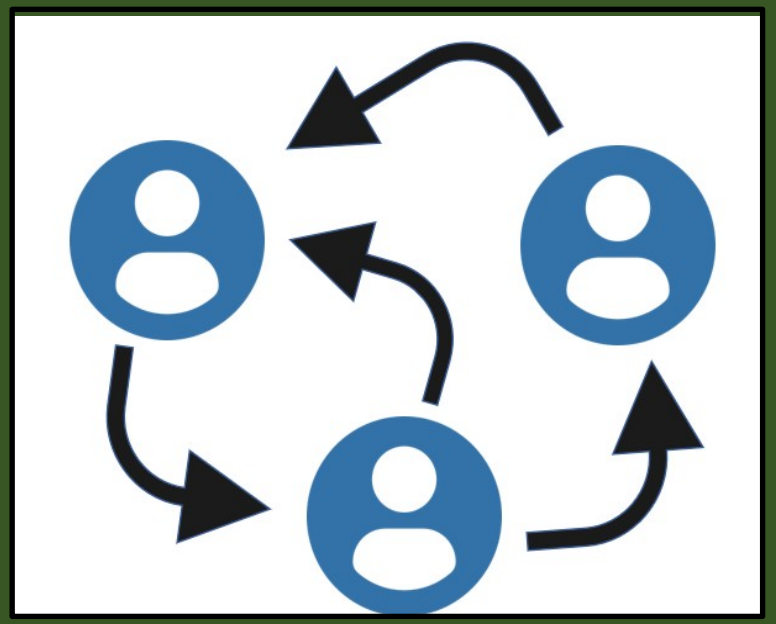
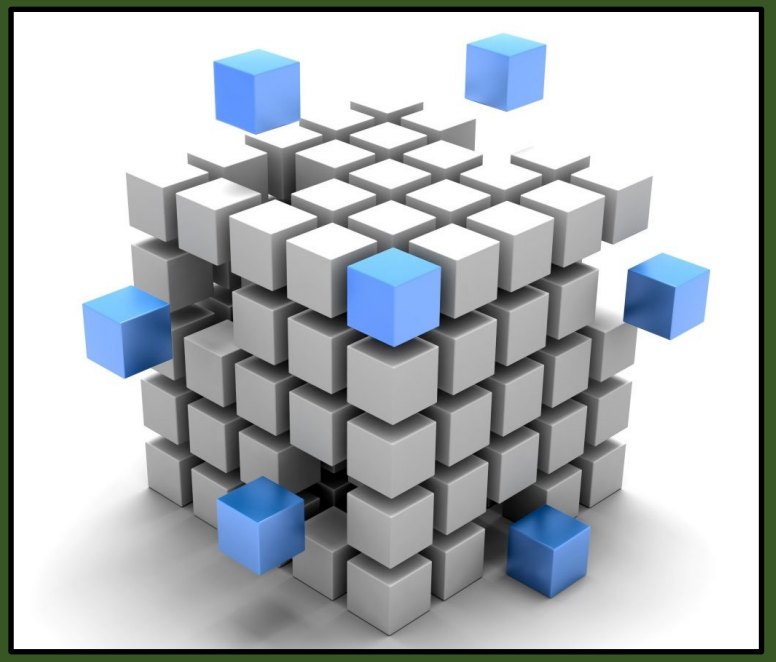
System Architecture Design Choices



Actor Model

- Actor model sees each actor being functional as its own independent subsystem.
- Actors can send and and receive messages and choose how to respond to the input locally.
- Allows for asynchronous communication.

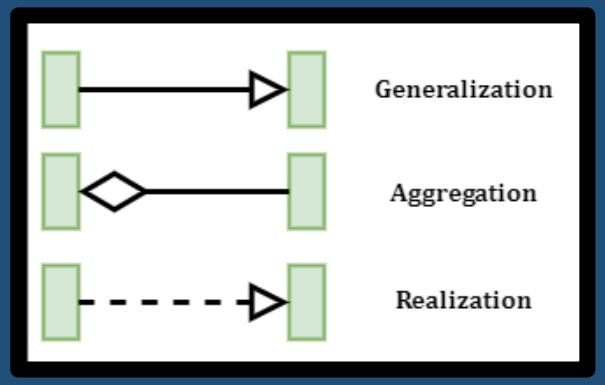


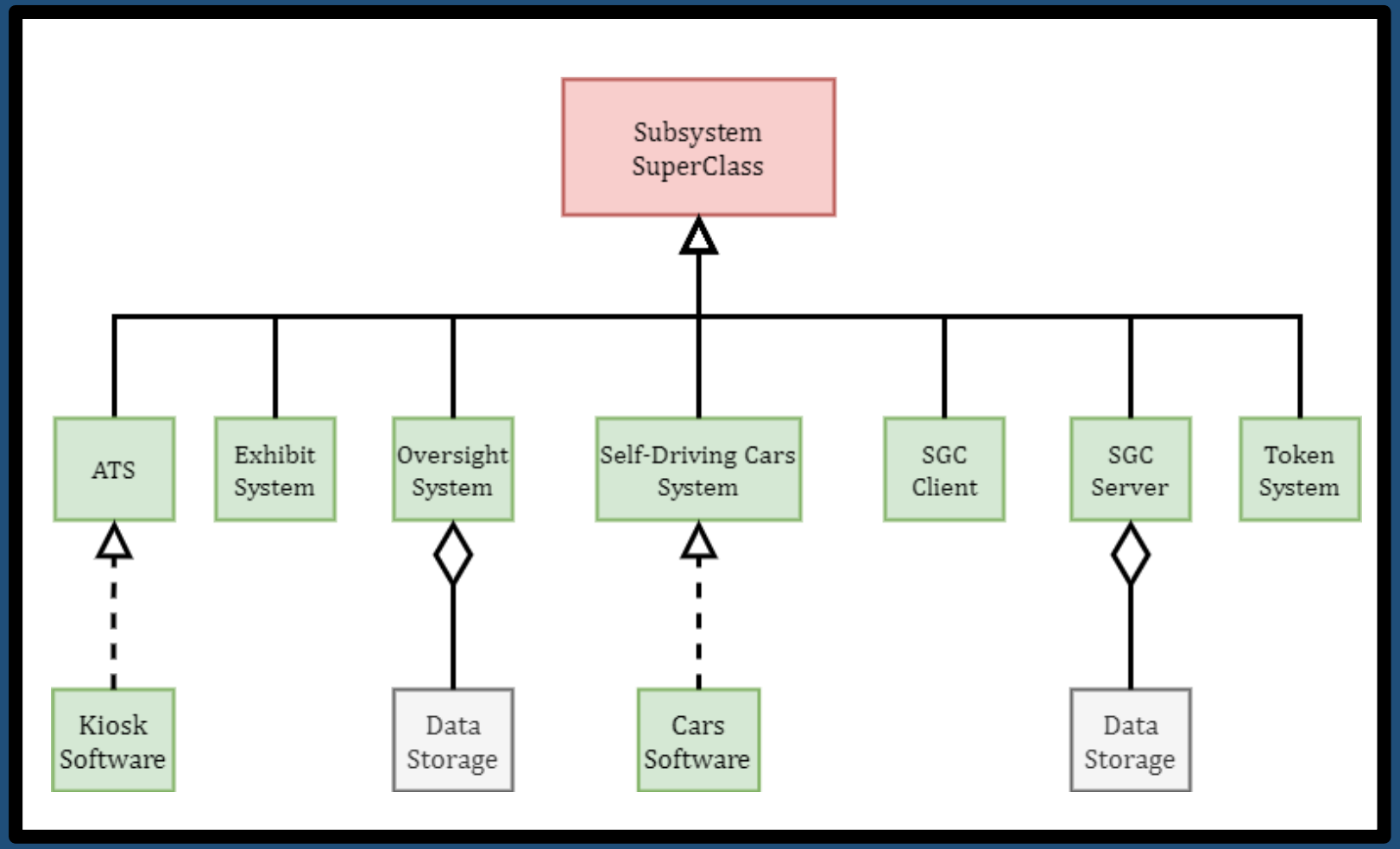
Modular Subclassing

- Superclass can be defined with the majority of the universal functionality while subclasses can define their specific requirements.
- Allows for modularity of design and easy additions or removals of components to the system.
- Superclass Component is extended by all subclasses defines the general outline for all components.

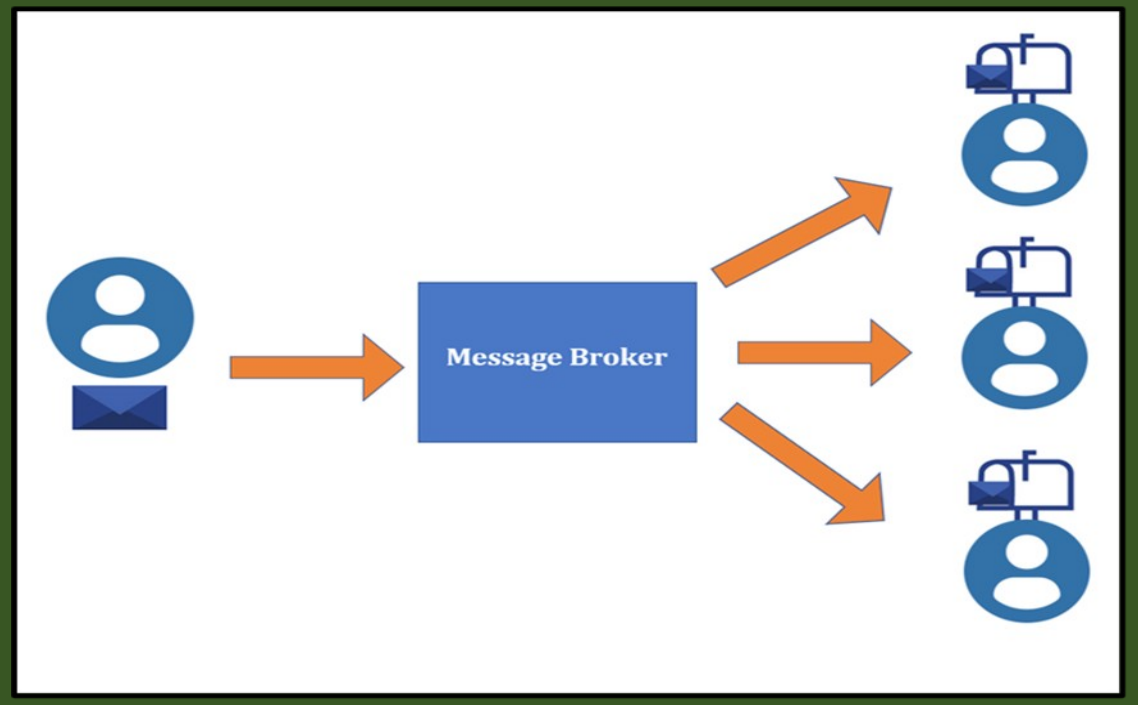
Class Diagram

Legend



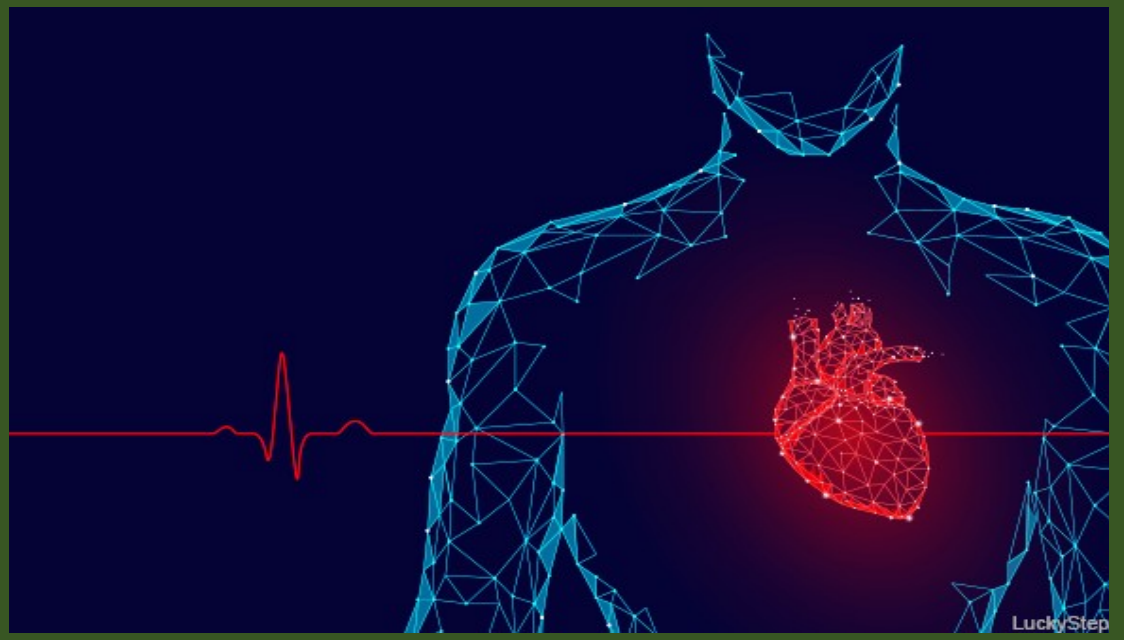


System Architecture Design Choices *Continued...*



Message Broker

- Message broker mediates various messages from range of components while they have minimal awareness of each other.
- Predefined messages are sent from components to broker and placed on a message queue before being delivered to destination.
- Allows for asynchronous communication between components.

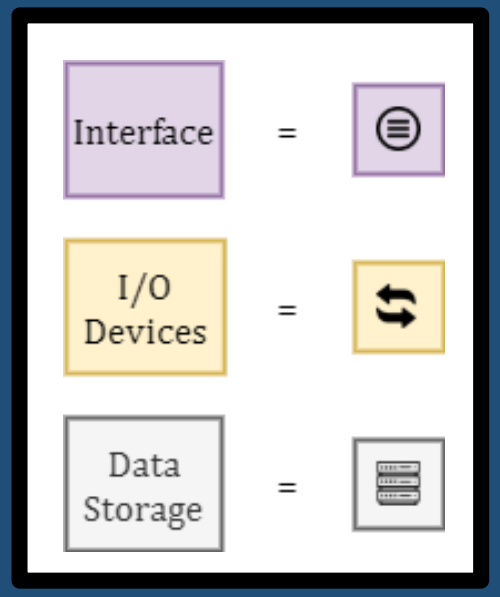


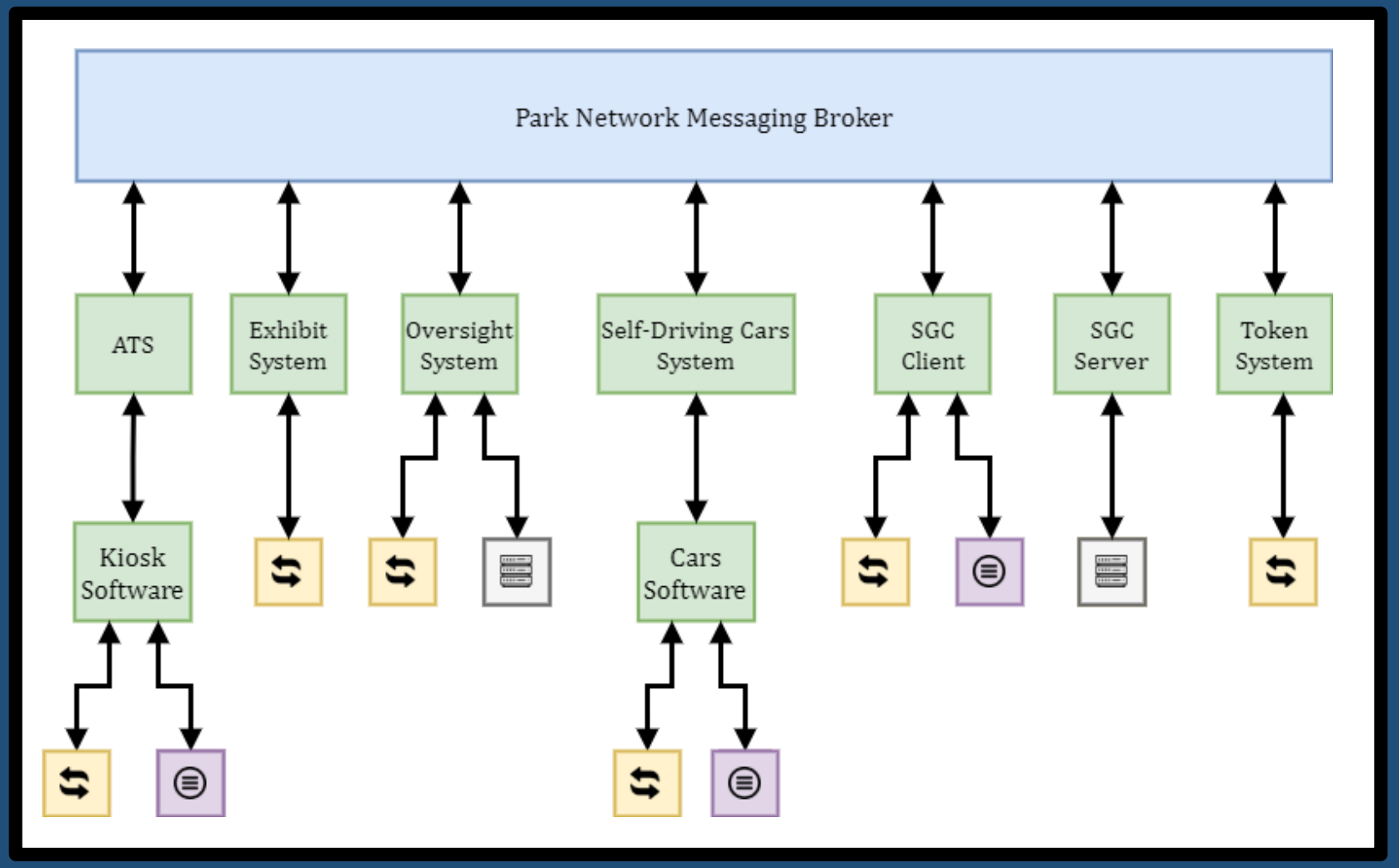
Heartbeat Signals

- Used for notifying controller that devices are operating normally.
- Periodic notification sent to indicate normal function.
- If signal stops, it indicates a malfunction or break in the device.

System Architecture

Legend





Components – Siesta Gardens Controller (SGC) Client/Server

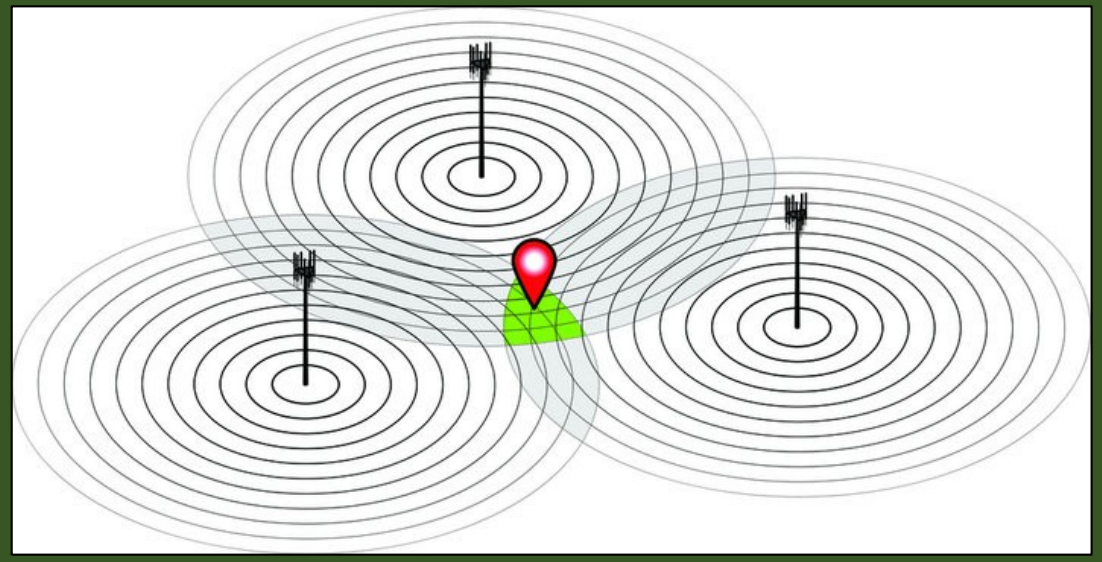
- Serves as main controller for park subsystems.
- Comprised of server for the park network and client GUI.
- Is the primary destination for subcomponent messages containing data.
- GUI allows for park administrators to look at current status of park and to respond to any issues.
- Receives messages and data through the message broker from the following subcomponents:
  - Token Monitoring System
  - Oversight System
  - Exhibit System
  - Self Driving Car System
  - Automated Ticket System

Components – Automated Ticket System (ATS)

- Contains Kiosk GUI that allows customers of the park to agree to waiver, submit payment information, and be verified for park access.
- Kiosk GUI sends information to ATS to verify payment.
- Once verified, a Person object is created to store customer information.
- ATS sends customer information to SGC.
- SGC can shutdown kiosks in case of emergency.

Components – Token Monitoring System

- Monitors the location of each active token in the park.
- Uses RFID Pylons throughout the park to track the Tokens given to each Visitor.
- Tokens are physical pieces of hardware with a RFID Chip inside them.
- Tokens are logged into the Token Monitoring System with its unique ID, Visitor Info, and its location.
- Location is updated as the RFID chips are read by the Pylons and then translated into X and Y coordinates.
- Maintains the generation and removal of new token IDs.



Components –Self Driving Car System

- System integrates data received from the self driving sensors on the cars.
- System checks to see if there are any obstructions and notifies the SGC through the message broker if there are any.
- Checks list of in use tokens and only allows those those passengers on.
- Manages all of the signals that can be sent from the SGC including shutdown signal that can be activated in case of emergency.

Components – Oversight System

- Serves as a means of communication with the SGC and as a way to directly monitor video feeds and alarm systems.
- GUI allows guard stations throughout the park to monitor the live feed from various cameras around the park and the general status of the alarms.
- Camera feeds use a Stream to provide constant data to the SGC.
- Defines the reactions to commands coming in from the message broker.

Components – Exhibit System

- The Exhibit Component is a subclass of the Component superclass.
- The Exhibit communicates the status of the T-Rex Enclosure and its devices through the use of heartbeat signals.
- In the event of a catastrophic failure to the exhibit, an Alarm will be sent out to all Components for the safety of Siesta Garden Visitors.

Demonstration