Critical Design Review

Unified Software Team

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Overview

- Overall Block Diagram
- Firmware
- Gateway
- Database

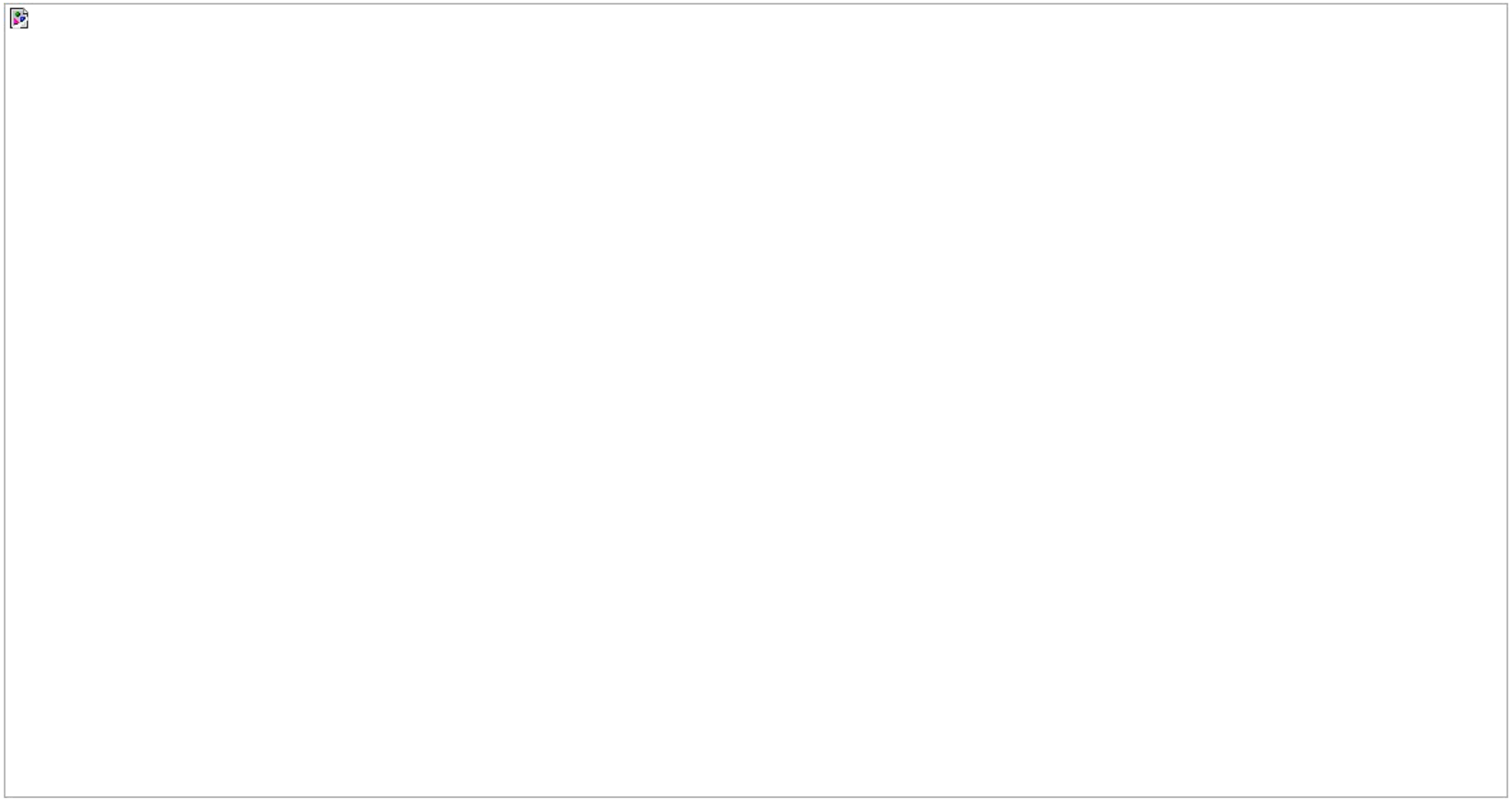
Block Diagram(s)
Algorithms
Progress
Problems/Issues
Future Improvements

Functional Overall Block Diagram

2.
Firmware

Firmware Functional Block Diagram

Firmware Design Block Diagram



Firmware Algorithms

- Initialization
  - Create and initialize board struct and run Power On Self-Test
- Execution
  - Heartbeat Packets
    - Sample Diagnostic data, then construct and send packets
  - Data Packets
    - Sample Sensor data, then construct and send packets
  - Command Mode
    - Interrupt execution, perform task based on user input

Firmware - Progress

- Apple
  - Implemented GPS Library
  - Rewrote XBee Library
- Cranberry
  - Deployed weatherbox
- Dragonfruit
  - Determined that the ADC chip on the board was not the one referenced in the schematic
  - All sensors getting readings within our expected range

Firmware - Problems and Issues

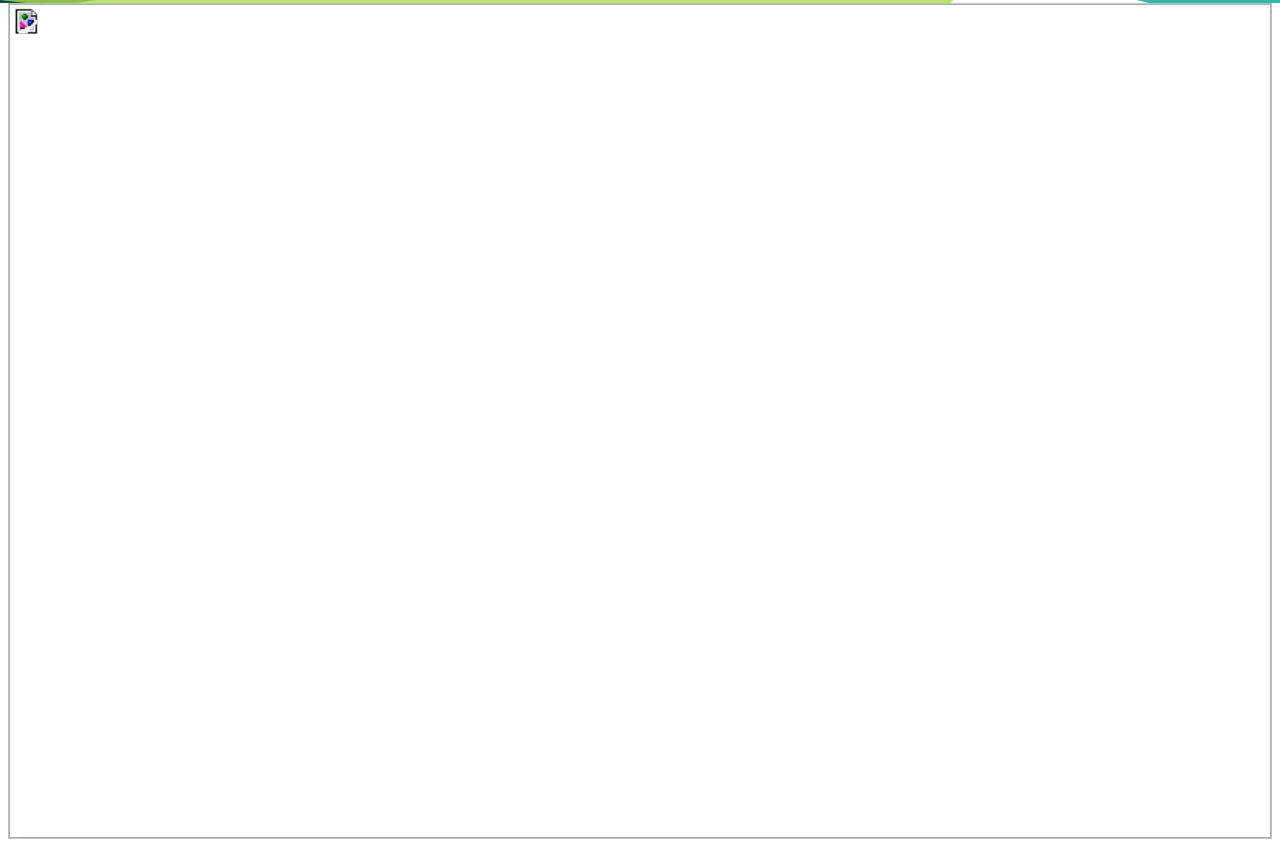
- Apple
  - GPS Library memory heavy
  - SRAM memory filled
- Cranberry
  - Temperature data overflow
  - Coordinating with UST to add future features
- Dragonfruit
  - 1st board - Inconsistent packet sending
  - 2nd board - Ready to deploy
  - Improve existing documentation

Firmware - Future

- Communicate with weatherbox hardware teams so they can modify their device drivers
- Create detailed documentation and user manual
- Reduce the power consumption
- GPS and Real Time Clock Integration

3.
Gateway

Gateway Block Diagram



Gateway - Progress

Gateway Functionality

- Develop write_to_db() function
  - psycopg2 python library
- Fix bugs
  - Crashing issue
  - Faulty decoding of some packets
- Improve write_to_csv() function
  - Fix overwriting issue
  - Implement separate .csv files for each schema

Gateway Pseudocode

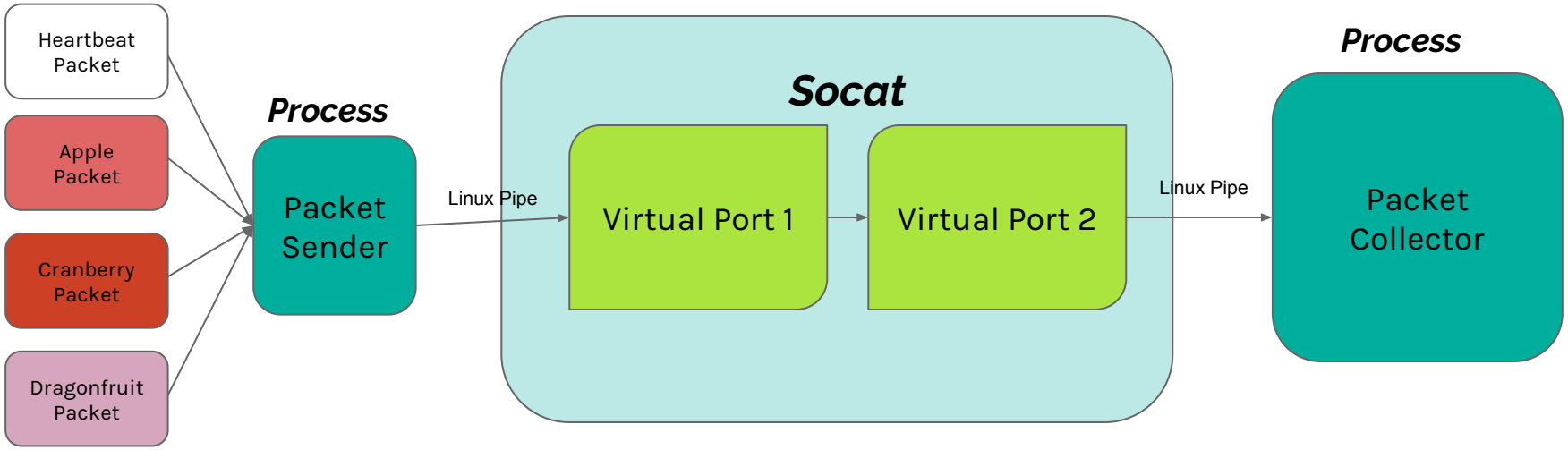
```
while no packets to process:
        wait for packets

extract rf data from packet
determine schema number
If schema is 0
        decode as heartbeat packet
else if schema is 1
        decode as apple packet
else if schema is 2
        decode as cranberry packet
else if schema is 3
        decode as dragonfruit packet

Print data to stdout
Add data to respective .csv file
Write data to respective database table
```

Gateway - Progress

Simulation

- Create fake packets for the other schemas
  - Added Cranberry, Dragonfruit, and Bad Packet

Simulation Process Diagram



Gateway - Problems and Issues

- Gateway process needs to be reset after extended periods of time
  - Investigating hardware/software solutions
- Database still not initialized
  - Can’t test write_to_db() function

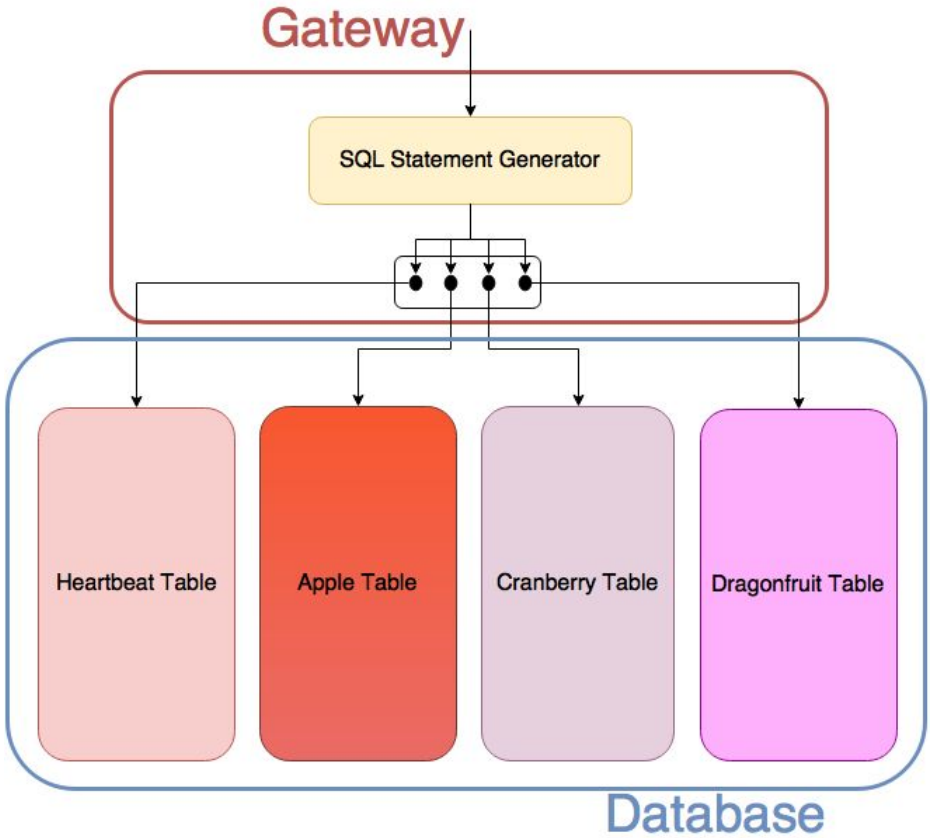
Gateway - Future

Gateway Functionality

- Implement check to reset gateway
- Verify write_to_db() function
- Parse data into format suitable for Forecasting
- Add feature to automatically determine xbee port

4.
Database

Database Block Diagram



Database - Progress

- Began development of database initialization shell script
  - PostgreSQL
  - Table for each schema
- write_to_db() function implemented in gateway
  - Waiting to test

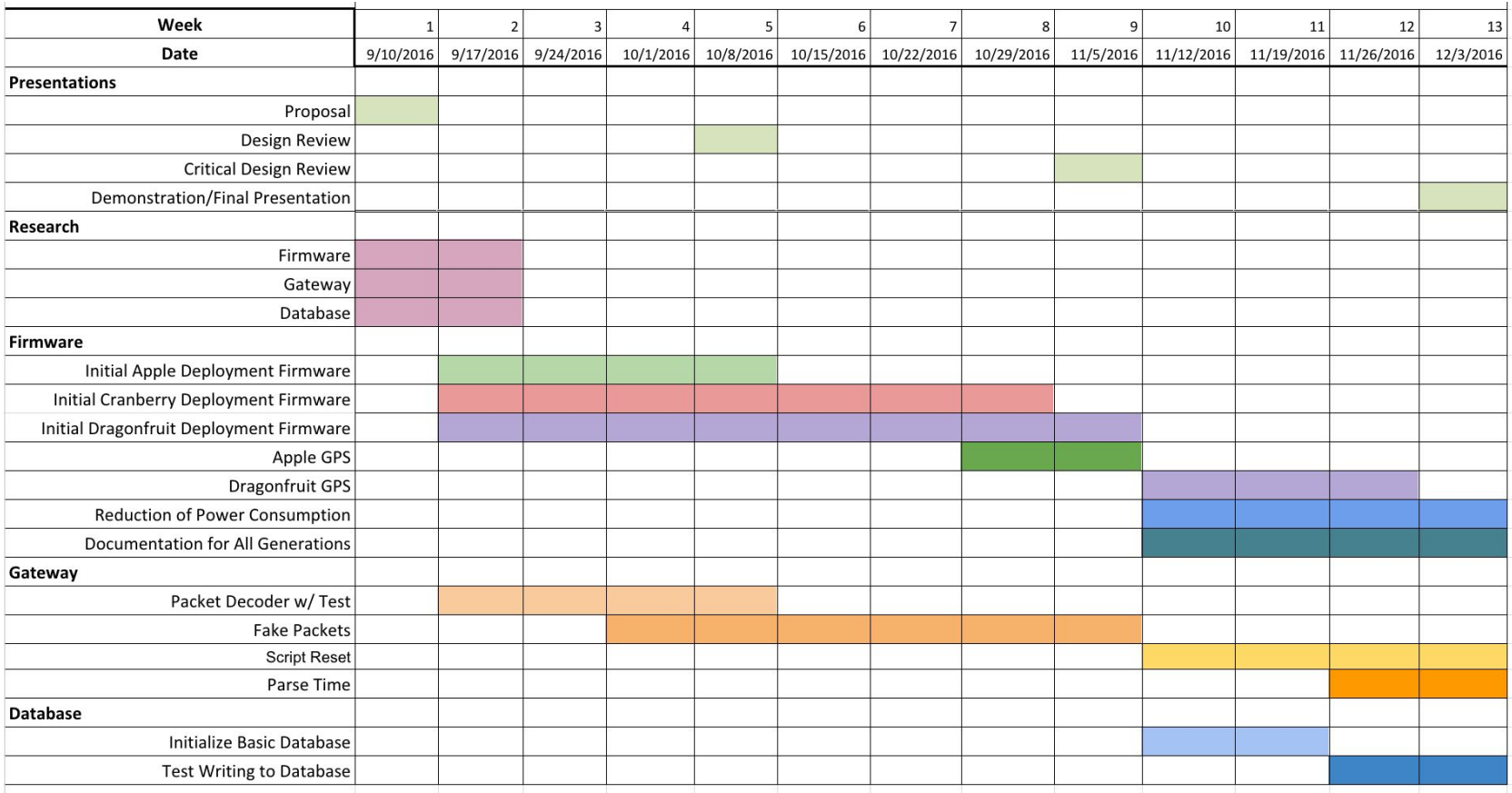
Database - Issues and Problems

- Focusing on other aspects of the software system first
  - Firmware
  - Gateway

Database - Future

- Test database initialization
- Test write_to_db() gateway function
- Implement a method for lab members to access data in database

Gantt Chart



Week	1	2	3	4	5	6	7	8	9	10	11	12	13
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Presentations													
Proposal													
Design Review													
Critical Design Review													
Demonstration/Final Presentation													
Research													
Firmware													
Gateway													
Database													
Firmware													
Initial Apple Deployment Firmware													
Initial Cranberry Deployment Firmware													
Initial Dragonfruit Deployment Firmware													
Apple GPS													
Dragonfruit GPS													
Reduction of Power Consumption													
Documentation for All Generations													
Gateway													
Packet Decoder w/ Test													
Fake Packets													
Script Reset													
Parse Time													
Database													
Initialize Basic Database													
Test Writing to Database													


Questions