

Macrometa<sup>★</sup>

Fleet Management  
Hitachi

P R I V A T E   &   C O N F I D E N T I A L

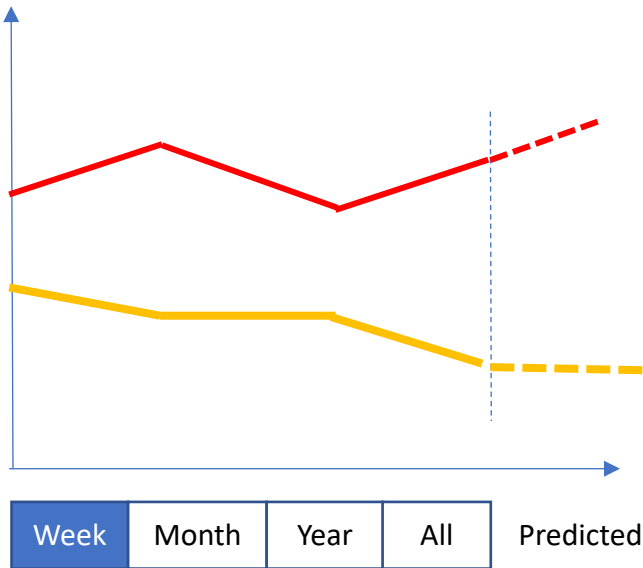
J U N E   2 0 2 1

Start

Stop



Fleet Status



|                                     |   |        |
|-------------------------------------|---|--------|
| Attention Required (Next 7 Days)    | ▲ | 1048   |
| Critical Status (Next 7 days)       | ▼ | 374    |
| Fleet Health (Last 7 Days)          | ▼ | 89.04% |
| Unplanned Maintenance (last 7 Days) | ▲ | 171    |
| Planned Maintenance (Next 7 Days)   | ▲ | 234    |
| Predicted Maintenance               | ▲ | 35.69% |



Insights

|                                     |              |             |
|-------------------------------------|--------------|-------------|
| Vehicle With Most Frequent Issues   | PF16VBD      | Investigate |
| Most Common Alert                   | Brakes       | Investigate |
| Average Driver Behaviour            | Good         | Investigate |
| Total Cost of Unplanned Maintenance | £4,230       | Investigate |
| Area with most critical Alerts      | Manchester   | Investigate |
| Least Cost Effective Vehicle        | Ford Transit | Investigate |



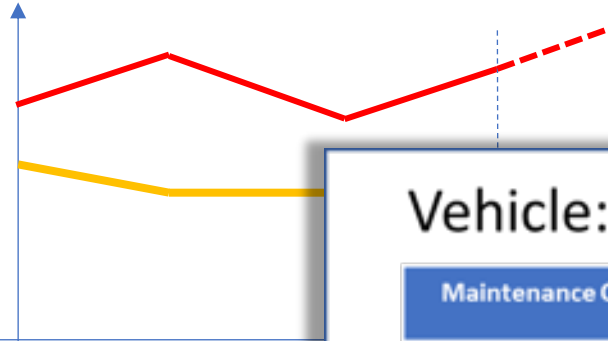
Alerts

| All (202)      |                   |              |              |                     |                     |
|----------------|-------------------|--------------|--------------|---------------------|---------------------|
| Critical (23)  |                   |              |              |                     |                     |
| Attention (75) |                   |              |              |                     |                     |
| Booked (104)   |                   |              |              |                     |                     |
| Vehicle ID     | Alert Description | Date Logged  | Status Level | Maintenance Planned | Suggested Action    |
| PF16VBD        | No Start          | Just Now     | Critical     | No                  | <div>Book</div>     |
| GD67GGU        | Flat Battery      | Last Hour    | Critical     | Yes                 | Booked 25 Aug 2021  |
| GD67GGF        | Steering          | Today        | Attention    | Yes                 | <div>Book</div>     |
| GD17XOC        | Brake Lights      | Yesterday    | Attention    | No                  | <div>Book</div>     |
| GD66LLD        | Water Pump        | 10 June 2021 | Attention    | Yes                 | Booked 13 Sept 2021 |
| GD17XNE        | Radiator          | 10 June 2021 | Attention    | Yes                 | Booked 13 Sept 2021 |





## Fleet Status



|                                     |   |      |
|-------------------------------------|---|------|
| Attention Required<br>(Next 7 Days) | ▲ | 1048 |
| Critical Status<br>(Next 7 days)    | ▼ | 374  |

Week Month Year



## Inspection

|                                     |              |             |
|-------------------------------------|--------------|-------------|
| Vehicle With Most Frequent Issues   | PF16VBD      | Investigate |
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## Alerts

All (202)

Critical (23)

Attention (75)

Booked (104)

| Vehicle ID | Alert Description | Date Logged  | Status Level | Maintenance Planned | Suggested Action       |
|------------|-------------------|--------------|--------------|---------------------|------------------------|
|            |                   |              |              | No                  | <button>Book</button>  |
|            |                   |              |              | Yes                 | Booked<br>25 Aug 2021  |
|            |                   |              |              | Yes                 | <button>Book</button>  |
|            |                   |              |              | No                  | <button>Book</button>  |
|            |                   |              |              | Yes                 | Booked<br>13 Sept 2021 |
| GD17XNE    | Radiator          | 10 June 2021 | Attention    | Yes                 | Booked<br>13 Sept 2021 |
| PF66BXO    | NOS               | 7 June 2021  | Attention    | No                  | <button>Book</button>  |



1

2

3

4

5

6

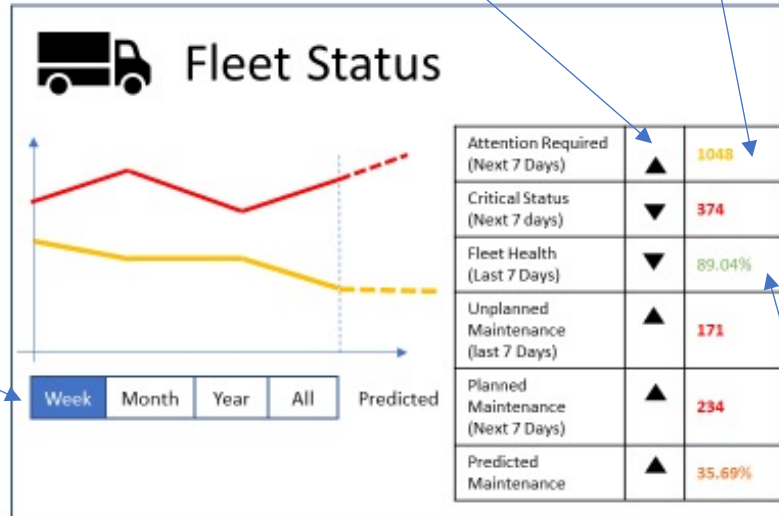
7



Filter on time frame

Arrows show  
change more/less  
over previous  
numbers

Calculated  
Insights



### Insights Generated

|                                     |              |             |
|-------------------------------------|--------------|-------------|
| Vehicle With Most Frequent Issues   | PF16VBD      | Investigate |
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Calculated  
Insights

Filter on status level

Telematics &  
Brake downs

### Alerts

All (202) Critical (23) Attention (75) Booked (104)

| Vehicle ID | Alert Description | Date Logged  | Status Level | Maintenance Planned | Suggested Action     |
|------------|-------------------|--------------|--------------|---------------------|----------------------|
| PF16VBD    | Glow Plugs        | Just Now     | Critical     | No                  | <a href="#">Book</a> |
| GD67GGU    | Exhaust           | Last Hour    | Critical     | Yes                 | Booked 25 Aug 2021   |
| GD67GGF    | Steering          | Today        | Attention    | Yes                 | <a href="#">Book</a> |
| GD17XOC    | Brake Lights      | Yesterday    | Attention    | No                  | <a href="#">Book</a> |
| GD66LLD    | Water Pump        | 10 June 2021 | Attention    | Yes                 | Booked 13 Sept 2021  |
| GD17XNE    | Radiator          | 10 June 2021 | Attention    | Yes                 | Booked 13 Sept 2021  |
| PF66BXO    | NOS               | 7 June 2021  | Attention    | No                  | <a href="#">Book</a> |

Navigation: 1 2 3 4 5 6 7

Book button  
takes to  
maintenance  
centre selection

Fleet health = % of Vehicles that  
are not critical or require attention

### Vehicle: PF16VBD



| Maintenance Centre    | Rating  | Location  | Estimated Time | Estimated Cost | Select |
|-----------------------|---------|-----------|----------------|----------------|--------|
| Prius Service Centre  | 5.0/5.0 | Liverpool | 1 Day          | £90.50         | Select |
| Audi Service Centre   | 3.9/5.0 | Liverpool | 1 Day          | £61.50         | Select |
| Earlsfield Care       | 4.4/5.0 | Liverpool | 2 Days         | £92.00         | Select |
| IC Motors             | 5.0/5.0 | Liverpool | 1 Day          | £84.00         | Select |
| HMC Fleet Maintenance | 1/5.0   | Liverpool | 2 Day          | £99.50         | Select |

Add up  
unplanned  
maintenance  
costs



## Insights Generated

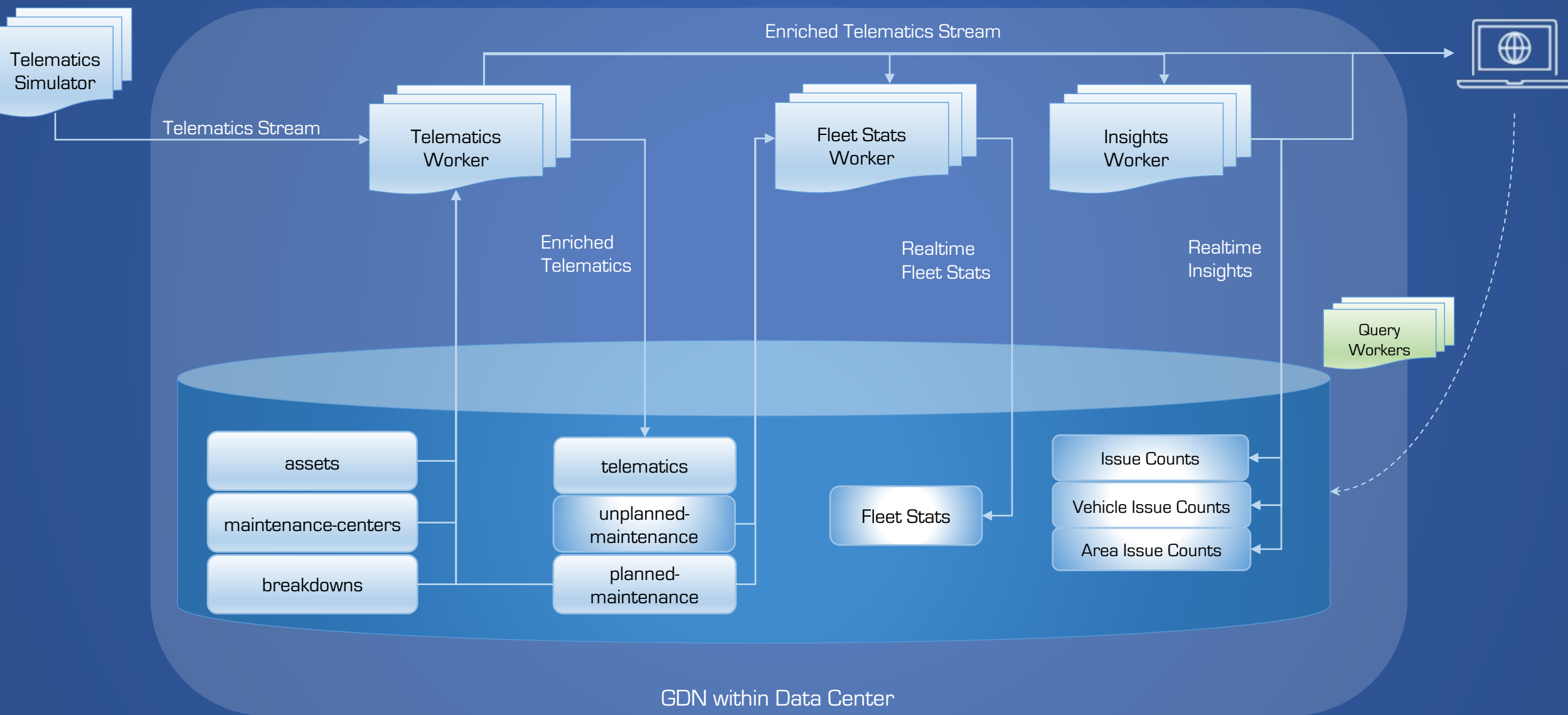
|                                     |              |             |
|-------------------------------------|--------------|-------------|
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Calculate which  
Vehicle has had  
the most faults?

Calculate which  
fault comes up  
the most?

Add up  
unplanned  
maintenance  
costs

# Fleet Management - Solution Architecture





# Solution Architecture – Collections

## Assets

```
{
  "Name": "Halfords",
  "Rating": "5.0/5.0",
  "Estimated_Cost": "£54.77", ◀ Random
  "Estimated_Time": "1 Day", ◀ Random
  "Address": "99 Street name"
  "City": "Liverpool", □ used for lookup
  "Post Code": "LP189XP"
}
```

## Breakdowns

```
{
  "Asset": "HG14PRU",
  "Timestamp": "9/Feb/2021:10:34:00",
  "Driver": "Lastname, Firstname",
  "Fault": "No Start",
  "Address": "99 Street name"
  "City": "Liverpool",
  "Post Code": "LP189XP"
}
```

## Planned Maintenance

```
{
  "Asset": "HG16PRU",
  "Booked_In": "9/Feb/2021:10:24:00",
  "Invoice_Number": "1234567",
  "Cost_Centre": "12345",
  "Vehicle_Description": "Ford Transit",
  "Driver": "Lastname, Firstname",
  "Work_Description": "Fix Brakes",
  "Work_Cost": "£54.77"
}
```

## Maintenance Centers

```
{
  "Name": "Halfords",
  "Rating": "5.0/5.0",
  "Estimated_Cost": "£54.77", □ Random
  "Estimated_Time": "1 Day", □ Random
  "Address": "99 Street name"
  "City": "Liverpool", □ used for lookup
  "Post Code": "LP189XP"
}
```

## Telematics

```
{
  "Asset": "HG14PRU",
  "Timestamp": "9/Feb/2021:10:34:00",
  "Driver": "Lastname, Firstname",
  "Fault": "Brakes",
  "Address": "99 Street name"
  "City": "Liverpool",
  "Post Code": "LP189XP"
}
```

## Unplanned Maintenance

```
{
  "Asset": "HG16PRU",
  "Booked_In": "9/Feb/2021:10:24:00",
  "Invoice_Number": "1234567",
  "Cost_Centre": "12345",
  "Vehicle_Model": "Ford Transit", ◀ Lookup
  "Driver": "Lastname, Firstname", ◀ Lookup
  "Work_Description": "Fix Brakes",
  "Work_Cost": "£54.77",
}
```



# Solution Architecture – Collections & Indices

## Fleet Stats

```
{
  "Date": "9/Feb/2021:00:00:00",
  "Attention_Required": "50",
  "Critical_Status": "25",
  "Planned_Maintenance": "30",
  "Unplanned_Maintenance": "10",
  "Predicted_Maintenance": "0",
  "Problem_Vehicles": "20"
}
```

## Vehicle Issue Counts

```
{
  "Asset": "HG14PRU",
  "Vehicle_Model": "Ford Transit",
  "Count": "20",
  "Total_Cost": "$200"
}
```

## Indices

- Asset ← Persistent Hash Index
- City ← Persistent Hash Index
- Fault ← Persistent Hash Index
- Date ← Persistent Hash Index
- Vehicle Model ← Persistent Hash Index

## Issue Counts

```
{
  "Fault": "No Start",
  "Count": "20"
}
```

## Area Issue Counts

```
{
  "City": "Manchester",
  "Count": "20"
}
```

# Solution Architecture – Buttons Behavior

## Start

1. Start Telematics Worker
2. Start Fleet Stats Worker
3. Start Insights Worker
4. Start Telematics Simulator

### Pre-Requisites:

- Check Demo\_Status collection for
  - Ready == True
- Disable Start Button till "Ready==True"

### Simulator Notes:

- Generate 3 telematics alerts every 3 seconds.
- Telematic alert composition every 3 seconds:
  - 2 Planned Maintenance
  - 1 Unplanned Maintenance
- Read from Telematics collection 3 random alerts maintaining above alert composition and change the timestamps to current time before publishing these alerts.

## Initialize

1. Truncate all collections
2. Load seed data for collections:
  - Assets,
  - Maintenance Centers
  - Planned Maintenance
  - Telematics
3. Generate data for derived collections:
  - Fleet Stats
  - Issue Counts
  - Area Issue Counts
  - Vehicle Issue Counts
4. Populate Demo\_Status Collection
  - {"ready": "true"}

## Stop

1. Stop Telematics Simulator
2. Stop Telematics Worker
3. Stop Fleet Stats Worker
4. Stop Insights Worker

# Solution Architecture – Stream Workers & Query Workers

## Telematics Worker

1. Check if the vehicle is in “planned maintenance” collection with a future date and set “Maintenance\_Planned” field to Yes/No accordingly.
2. Check the Fault Severity using “Alert Description” in the alert. Set accordingly the status level to “Critical/Attention”
3. Populate Telematics Collection.

## Fleet Stats Worker

1. Create a document for the current day if not present.
2. For each alert, update Fleet Stats document for the current day i.e., increment applicable counts
  1. Attention\_Required
  2. Critical\_Status
  3. Planned\_Maintenance
  4. Unplanned\_Maintenance
  5. Predicted\_Maintenance
  6. Problem\_Vehicles

## Insights Worker

1. For each alert, update the following collections and increment respective counts
  1. Issue Counts
  2. Vehicle Issue Counts & Cost
  3. Area Issue Counts

## Query Workers

1. Get Alerts [X days] – Default [X = 30 days] ← This is to show the Alerts table in dashboard. Update the Alerts table in real time as well..
2. Get Insights – Return all Insights together ← This is to show the insights table in dashboard. Update it every 3 seconds
3. Get Stats [X days] – Default [X = 30 days] ← This is to show fleet status table in dashboard. Update it every 3 seconds.
4. Get Total Unplanned Maintenance Cost