




**NAME:** F1 Telemetry Data Processing System 

**DATE:** June 26, 2026 12:11 PM


**DESCRIPTION OF TECHNOLOGY**  
A data engineering platform that ingests real Formula 1 data via the Fast F1 Api, stores it in PostgreSQL, simulates a "real time" race and processes this data through 2 parallel processing architectures ( Lambda and Kappa ) to compute lap time metrics per driver. Results are served via RestAPI and visualised on a web frontend.

**HUMAN VALUES** 


The technology is an educational tool for data engineering students and developers. It reinforces analytical thinking by presenting the same data processed two different ways side by side. It does not affect social relationships or create dependency.

**TRANSPARENCY** 


The research document explains both architectures and the trade-offs between them. The frontend clearly labels which architecture produced which results. There is no business model as this is an educational project.

**IMPACT ON SOCIETY** 


Understanding real-time data processing architectures is a genuine challenge in data engineering education. This project solves the problem of comparing Lambda and Kappa architectures theoretically without a working implementation. By building both in the same codebase, it makes the trade-offs visible and measurable rather than abstract.

**STAKEHOLDERS** 


- Nicole ( teacher )
- Xuemei ( teacher )
- Bogdan ( developer )

**SUSTAINABILITY** 


Running locally on Docker means energy use is limited to the developer's machine. The Redpanda broker is configured with minimal resources (512MB memory, 1 CPU).

**HATEFUL AND CRIMINAL ACTORS** 


The technology processes publicly available F1 race data and has no user authentication, payment systems, or sensitive data. The risk of criminal misuse is very low. The only realistic misuse would be scraping the API, which is mitigated by the fact this runs locally, not as a public service.

**DATA** 


The project uses FastF1's publicly available race data. Limitations include that FastF1 data may have gaps or inaccuracies for certain sessions, and lap times are historical not live. The system acknowledges this by treating the simulator as a replay tool, not a real-time feed.

**FUTURE** 

If extended, this platform could process live F1 telemetry data during actual race weekends. The architecture could be applied to other real-time sports analytics or IoT sensor data scenarios. The comparison between Lambda and Kappa could inform architectural decisions in larger-scale data engineering projects.

**PRIVACY** 

The technology does not register personal data. All data is sourced from the publicly available FastF1 API, which contains professional athletes' publicly published race performance data. No user accounts, tracking, or personal information is collected or stored.

**INCLUSIVITY** 


No significant built-in bias. The data covers all drivers in a race equally. The frontend and API are accessible via standard web browser. The main inclusivity limitation is that the project requires technical knowledge to set up and run locally it is not designed for non-technical end users.

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# QUICKSCAN - CANVAS - HELPSIDE1 Telemetry Data Processing System

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**HUMAN VALUES** 

**How is the identity of the (intended) users affected by the technology?**

To help you answer this question think about sub questions like:

- If two friends use your product, how could it enhance or detract from their relationship?
- Does your product create new ways for people to interact?...

**TRANSPARENCY** 

**Is it explained to the users/stakeholders how the technology works and how the business model works?**

- Is it easy for users to find out how the technology works?
- Can a user understand or find out why your technology behaves in a certain way?
- Are the goals explained?
- Is the idea of the technology explained?
- Is the technology company transparent about the way their...

**IMPACT ON SOCIETY** 

**What is exactly the problem? Is it really a problem? Are you sure?**

Can you exactly define what the challenge is? What problem (what 'pain') does this technology want to solve? Can you make a clear definition of the problem? What 'pain' does this technology want to ease? Whose pain? Is it really a problem? For who? Will solving the problem make the world better? Are you sure? The problem definition will help you to determine...

**STAKEHOLDERS** 

**Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by...**

When thinking about the stakeholders, the most obvious one are of course the intended users, so start there. Next, list the stakeholders that are directly affected. Listing the users and directly affected stakeholders also gives an impression of the intended context of the technology.

...

**SUSTAINABILITY** 

**In what way is the direct and indirect energy use of this technology taken into account?**

One of the most prominent impacts on sustainability is energy efficiency. Consider what service you want this technology to provide and how this could be achieved with a minimal use of energy. Are improvements possible?

**HATEFUL AND CRIMINAL ACTORS** 

**In which way can the technology be used to break the law or avoid the consequences of breaking the law?**

Can you imagine ways that the technology can or will be used to break the law? Think about invading someone's privacy. Spying. Hurting people. Harassment. Steal things. Fraud/identity theft and so on. Or will people use the technology to avoid facing the consequences of breaking the law (using trackers to evade speed radars or using bitcoins to launder...)

**DATA** 

**Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into...**

There are fundamental issues with data. For example:

- Data is always subjective;
- Data collections are never complete;
- Correlation and causation are tricky concepts;
- Data collections are often biased;...

**FUTURE** 

**What could possibly happen with this technology in the future?**

Discuss this quickly and note your first thoughts here. Think about what happens when 100 million people use your product. How could communities, habits and norms change?

**PRIVACY** 

**Does the technology register personal data? If yes, what personal data?**

If this technology registers personal data you have to be aware of privacy legislation and the concept of privacy. Think hard about this question. Remember: personal data can be interpreted in a broad way. Maybe this technology does not collect personal data, but can be used to assemble personal data. If the technology collects special personal data (like...

**INCLUSIVITY** 

**Does this technology have a built-in bias?**

Do a brainstorm. Can you find a built-in bias in this technology? Maybe because of the way the data was collected, either by personal bias, historical bias, political bias or a lack of diversity in the people responsible for the design of the technology? How do you know this is not the case? Be critical. Be aware of your own biases....

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