Path Transparency Observatory (PTO) Application Programming Interface (PAPI) Version 3: *Once More, With Feeling*

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mami

measurement and architecture for a middleboxed internet

measurement architecture experimentation

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What and why?

- PTO “shipped” on 1 March (MS4)
- We learned a lot from Piet’s experience writing analyses:
  - HDFS and Spark probably not fit for purpose
  - Unnecessary constraints on analysis module design
  - Automation impractical for an R&D environment
- Opportunity to clean up the design:
  - API was RESTfulish, but not quite…
  - Prior design didn’t really recognize that we have three separate applications that communicate via their backends.

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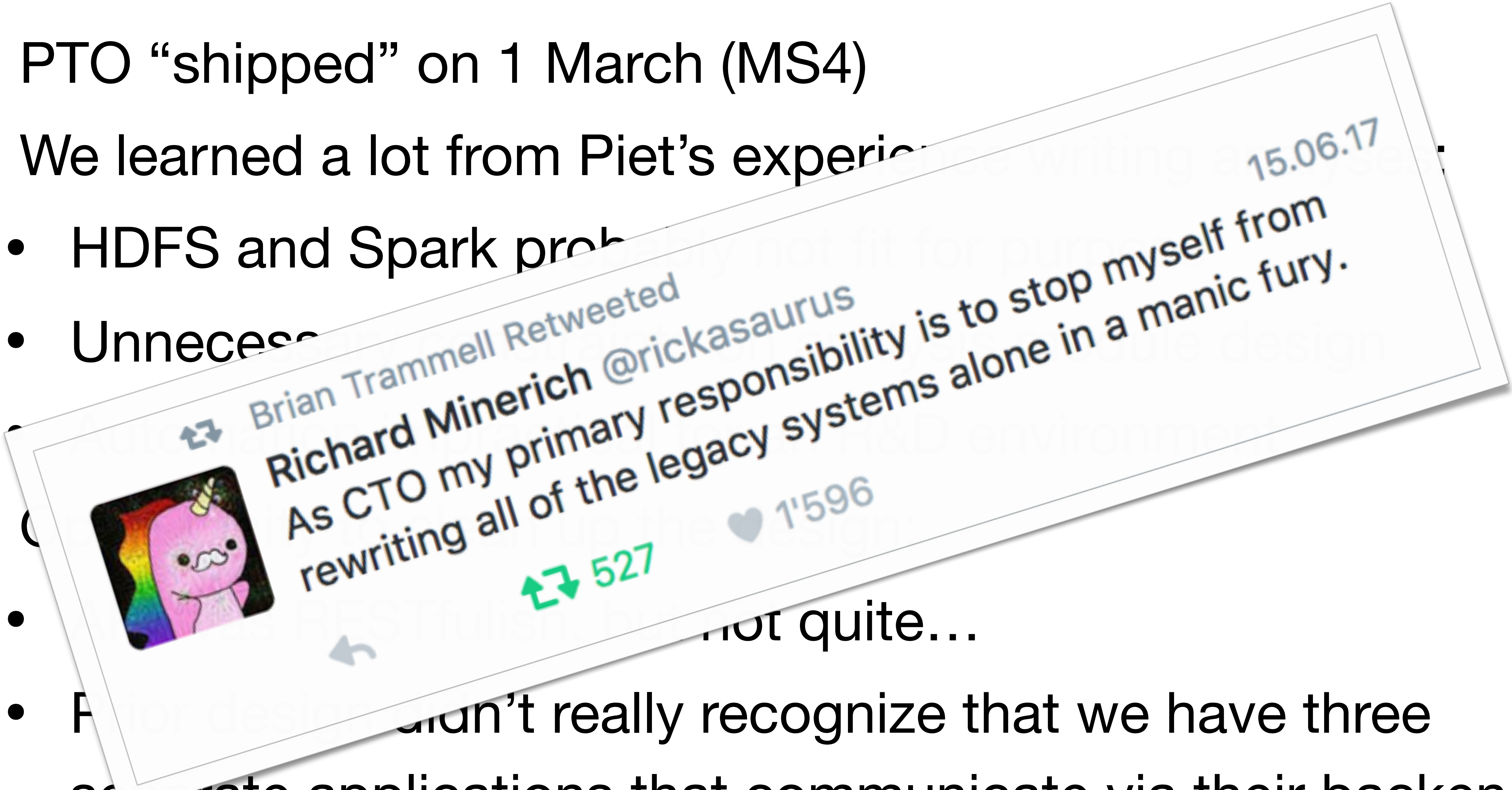

Brian Trammell Retweeted

Richard Minerich @rickasaurus 15.06.17

As CTO my primary responsibility is to stop myself from rewriting all of the legacy systems alone in a manic fury.

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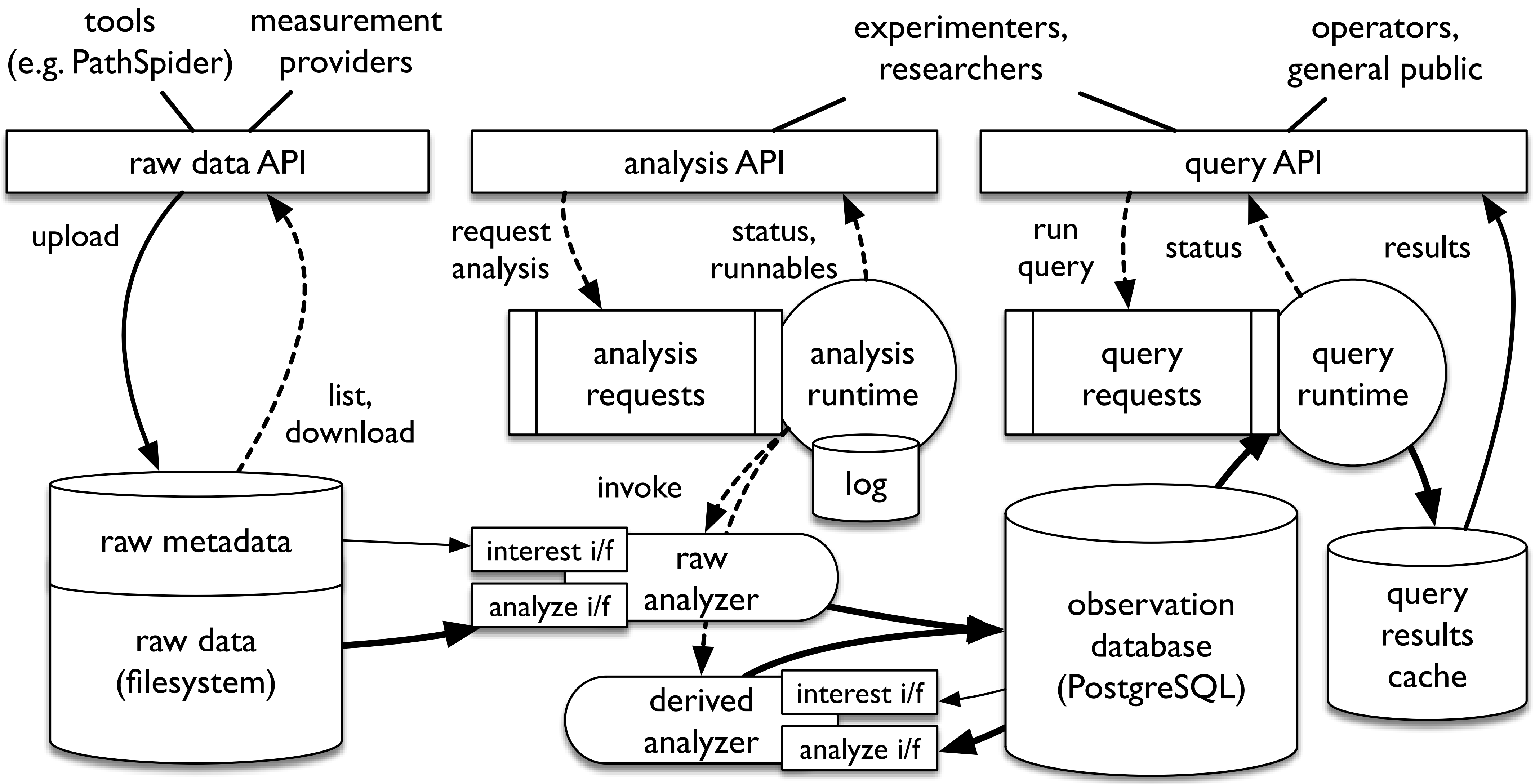
PTO v3 Architecture



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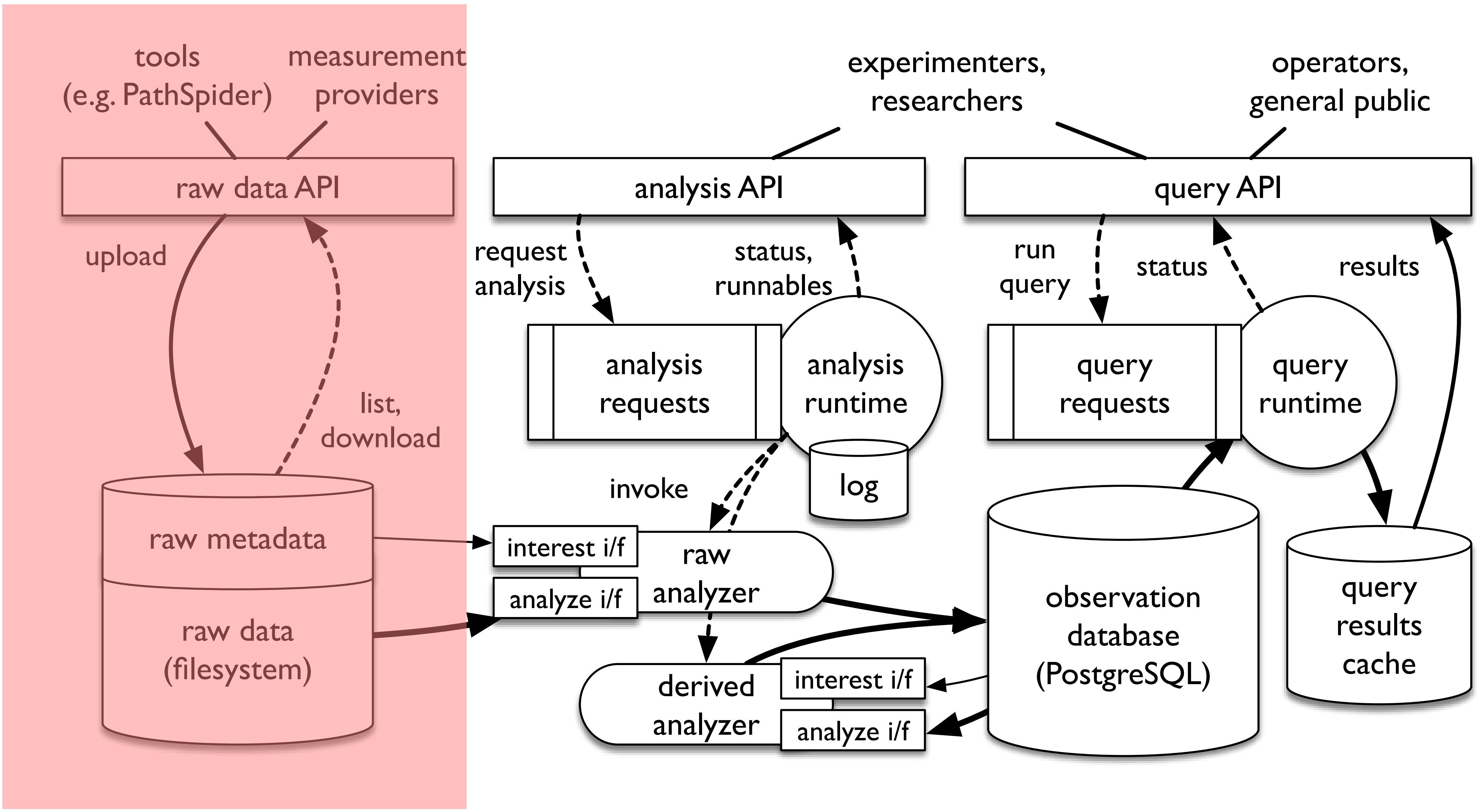

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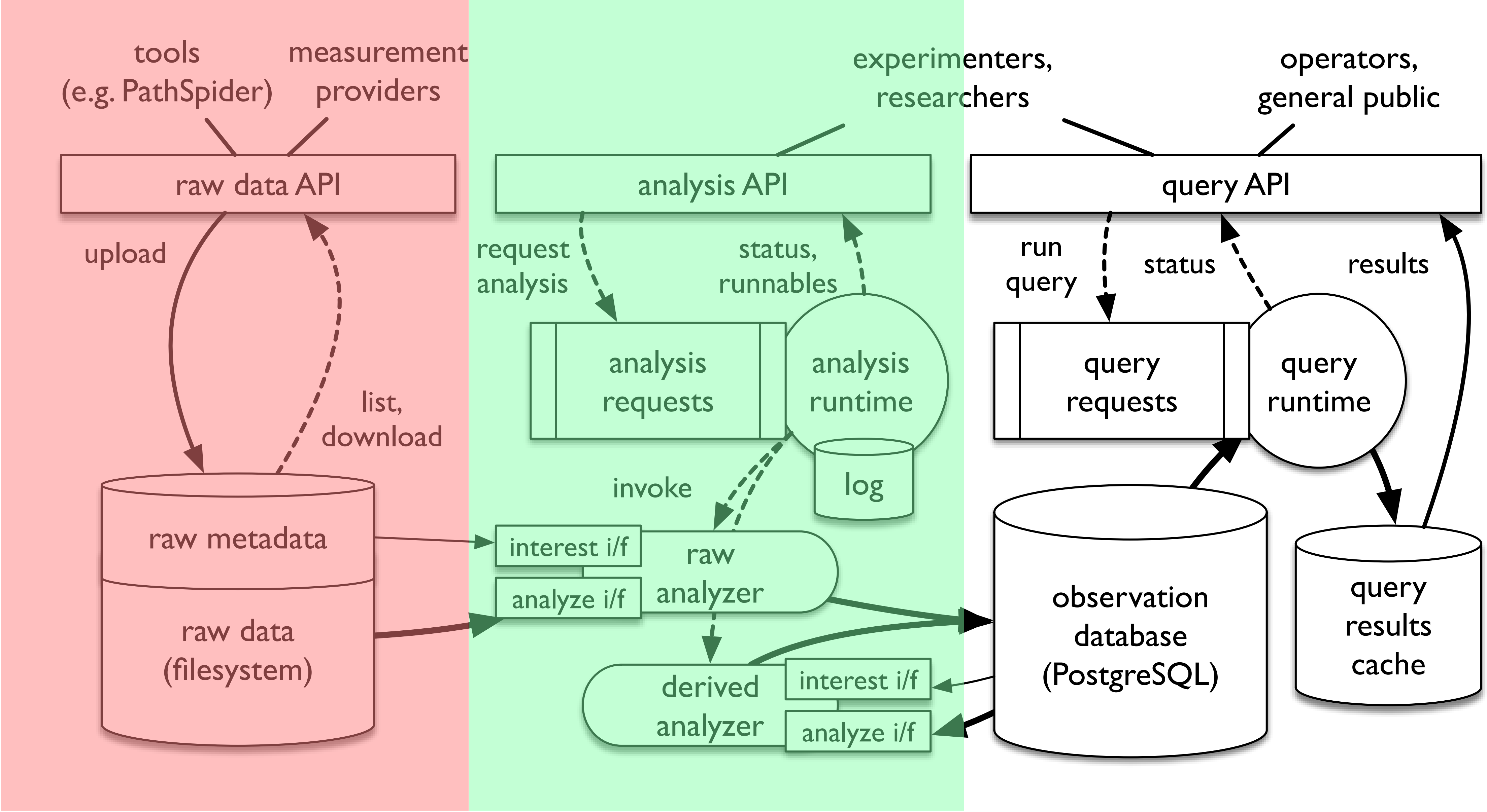

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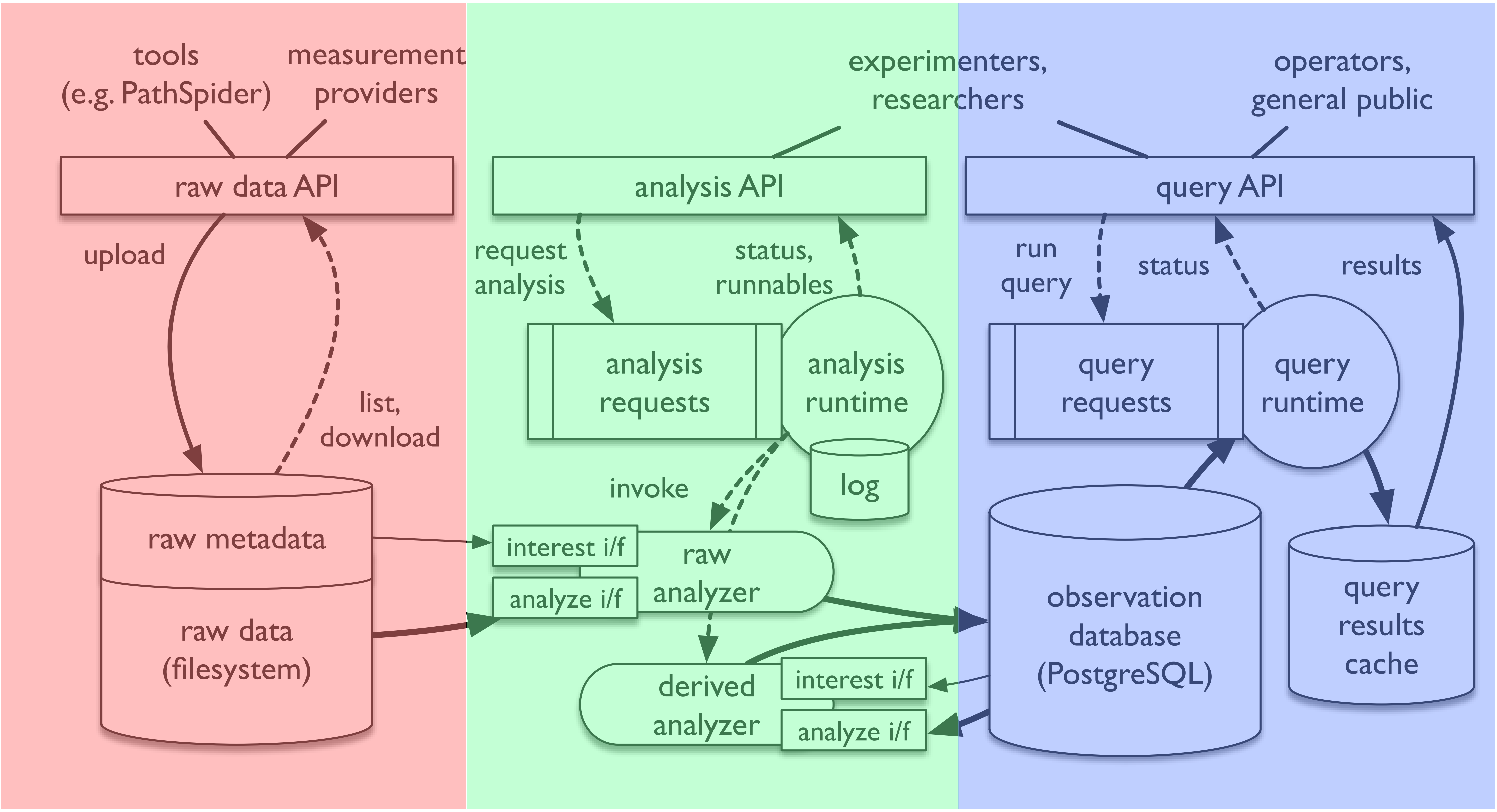

What remains the same?

- Abstract information model for observations unchanged… but now includes the notion of an *observation set.*
  - Set of observations that have the same provenance.
  - Roughly but not necessarily the result of an analysis run.

- No changes planned to IQL

/papi/v3/raw/

- Each campaign is an resource, representing its metadata
  - e.g. `/papi/v3/raw/my_campaign`
- Each file is a resource representing its metadata
  - e.g. `/papi/v3/raw/my_campaign/my_file.ext`
  - Files inherit, override metadata from their campaigns
- File contents are a separate resource under the file
  - e.g. `/papi/v3/raw/my_campaign/my_file.ext/data`
- All metadata and content is immutable once uploaded
  - Deletion is manual.
- No relational database necessary: all information stored in ext4.’
- passes tests, live on muninn at ETH Zürich in August ’17.

/papi/v3/analyzer

- Analyzers stored in git repositories at a defined path
    - Repository structure includes metadata
- Available analyzers listed at `/papi/v3/analyzer`
- Analyzer metadata at `/papi/v3/analyzer/analyzer_name`

- Analysis control happens through the **log** and the **queue**

/papi/v3/analysis/log

- List of analyses that *have* run or that *could* run.
  - where an “analysis” is
    - an {analyzer, raw file} or
    - {analyzer, observation set} pair

- `/papi/v3/analysis/log?…`
  list analyses meeting a set of criteria
- `/papi/v3/analysis/log/analysis-id`
  retrieve metadata for a specific analysis

/papi/v3/analysis/queue

- List of analysis runs *pending* or *in progress*
  - where an “analysis run” is
    - an {analyzer, raw file} or
    - an {analyzer, [list of observation sets]} pair

- `/papi/v3/analysis/queue?…`
  list current analysis queue
- `/papi/v3/analysis/queue/analysis-run-id`
  retrieve metadata for a specific analysis run
- POST to `/papi/v3/analysis/queue` to submit an analysis run, analysis run identifier is returned.

Analysis Module Interface

- Analysis modules are simply UNIX executables
  - Raw data input as stdin filehandle
  - Observation data input/output as ndjson array
  - Interest registration and metadata via command-line

- Advantages:
  - Can write analysis modules in any language
  - Can bulk load resulting observation sets into DB

/papi/v3/query/

- List of queries *pending* or *in progress*
  - where a query is an IQL object requesting operation(s) over a set of rows in the observation database
- `/papi/v3/query?…`
  list current query queue
- `/papi/v3/analysis/query/query-id`
  retrieve metadata and result (if available)
- POST to `/papi/v3/analysis/queue` to submit a query, query identifier is returned.

Next steps

- Raw data interface up in August
  - Restart auto-upload from PathSpider over SaltStack
- Next: port and write new analysis modules
- Then: port query interface and front-end

- Goal: slightly-better-than-research-grade, easily-installable, “medium data” PTO as end ’18 outcome of the project.