



ELC meeting – Performance Modeling Update

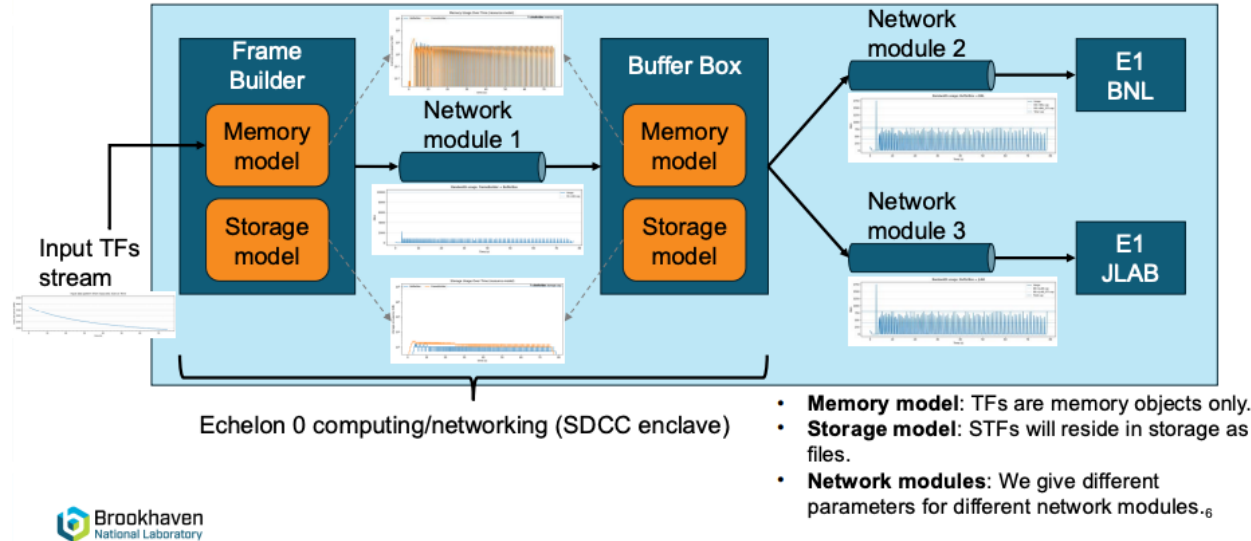
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Performance Modeling Overview

- Tailored into communication model and computing model
- The communication model status review



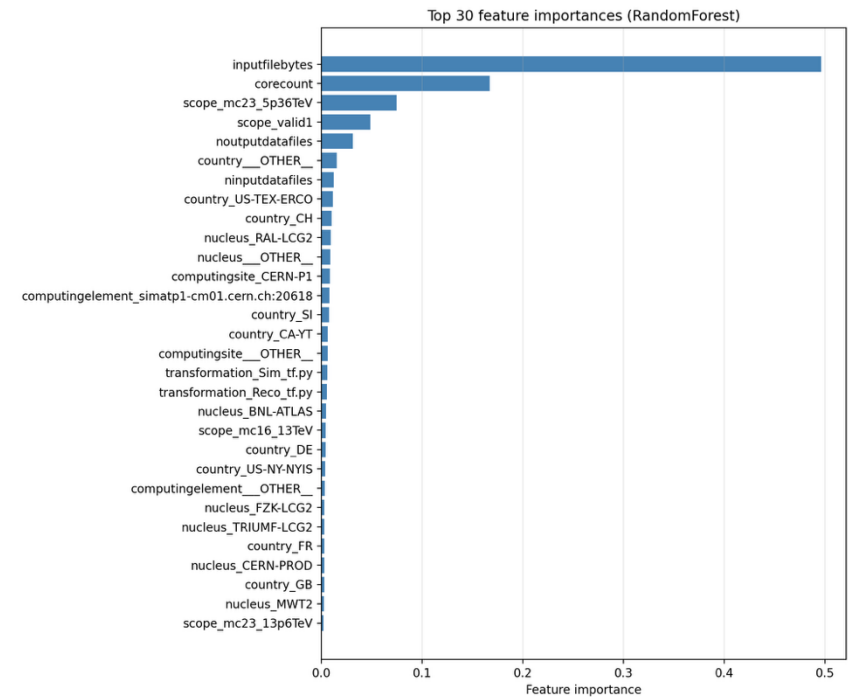
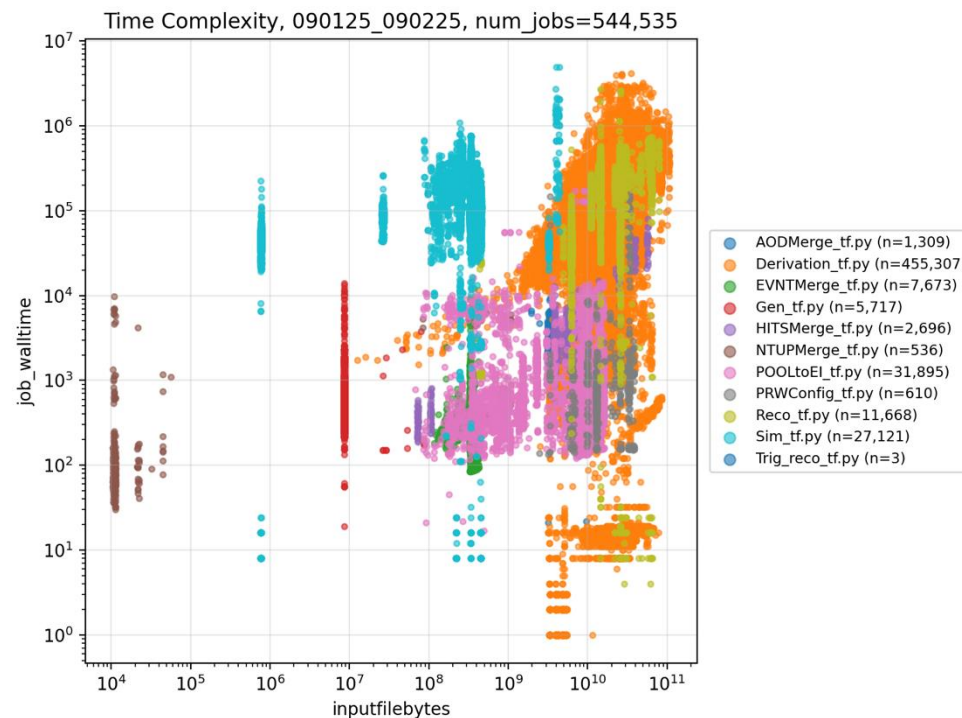
- The overall performance model eventually requires cooperation to predict **where** and **when** to execute task / transfer data.

Computing Model Building Framework

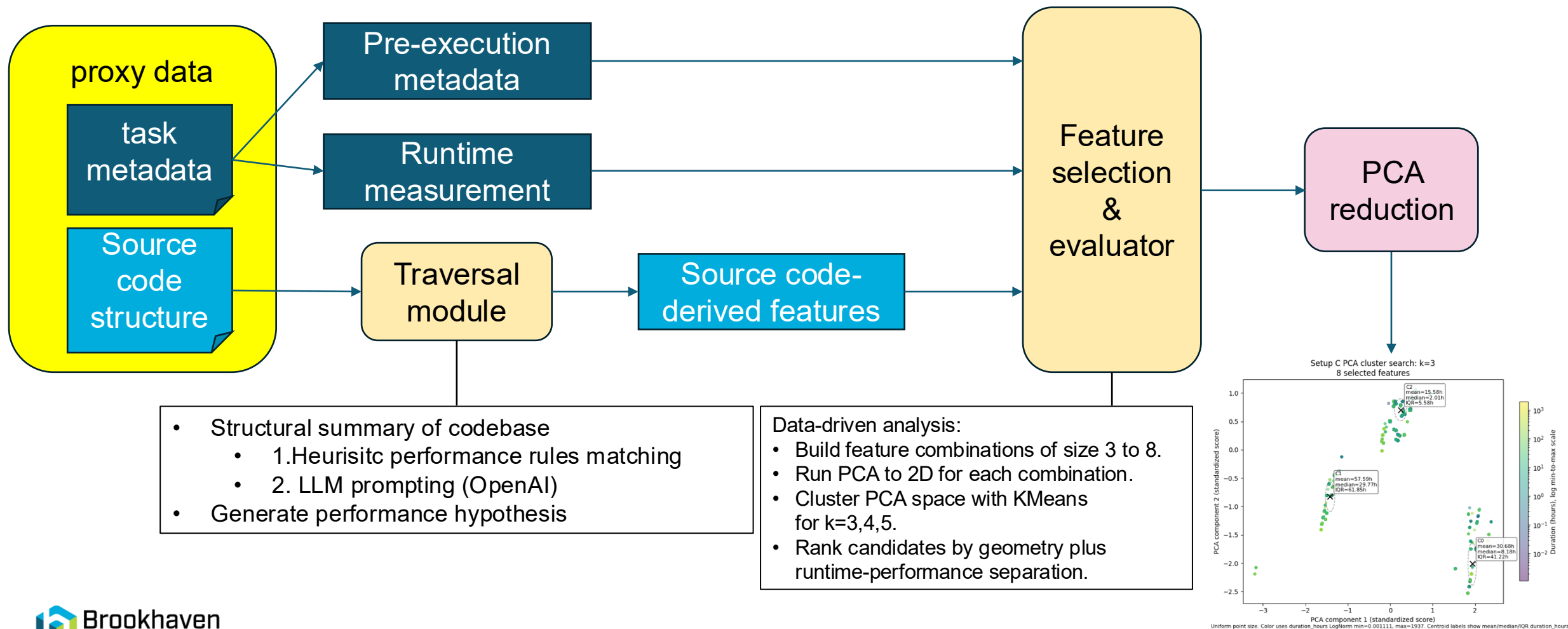
- Generic performance modeling framework building design that can agilely adapted to future EIC setting/or pre-EIC testbed/environment according to evolving system configurations.
- EIC/HEP domain-specific computing modeling that are tailored into 3 levels of model input considerations. The task is to identify critical performance factors with accuracy and generalizability that help to optimize scheduling via prediction.
- Use ATLAS WLCG database as data proxy for analysis framework building.

Performance Feature Analysis

- Understanding computing use cases from WLCG
 - Focused computing types: simulation, reconstruction

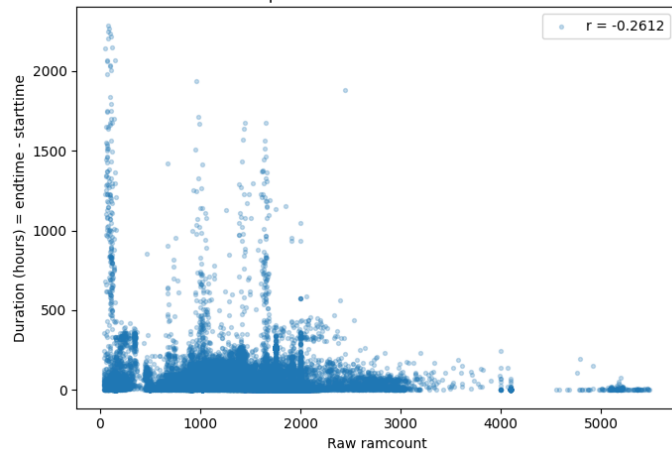


Agentic Performance Modeling Workflow

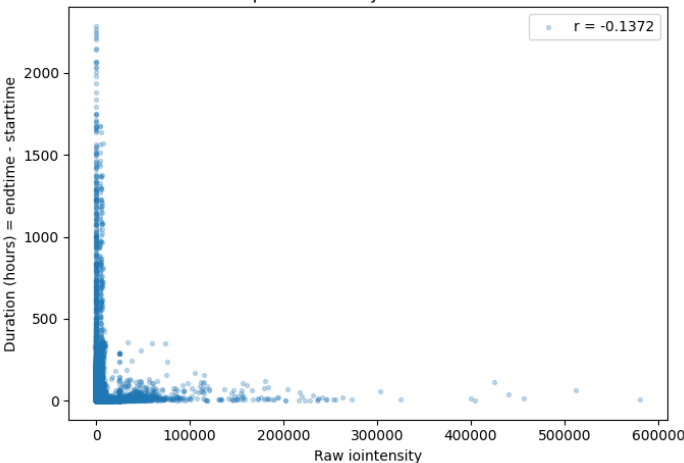


Prototyping Results

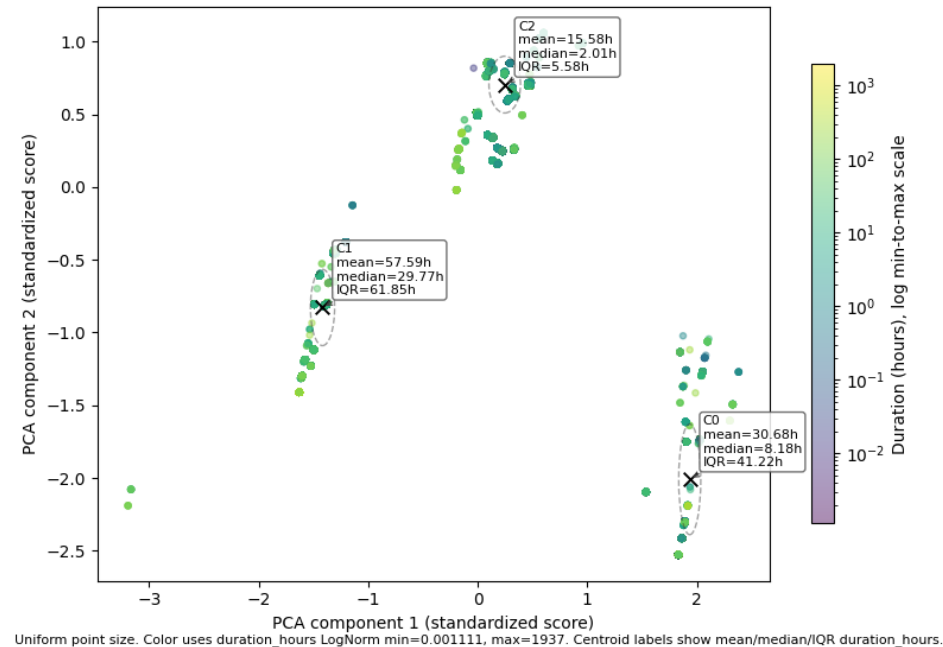
Setup B: ramcount vs task duration



Setup B: iointensity vs task duration



Setup C PCA cluster search: k=3
8 selected features



Source-code derived
features (generated by AI)

- **code_source_total_cvmfs_mentions**: total CVMFS-related source mentions across traversed code.
- **code_source_algorithmic_complexity_score_per_kloc**: normalized code complexity proxy per thousand source lines.
- **code_source_total_local_disk_pattern_mentions**: total local disk/path pattern mentions.
- **code_source_total_ast_node_count**: total parsed AST node count, a code size/structure proxy.
- **code_source_total_exception_handler_count**: total exception-handling blocks.
- **code_cvmfs_mentions**: CVMFS mentions in the directly matched/root source file.
- **meta_taskpriority**: task priority metadata.
- **code_source_external_process_score_per_visited_file**: external process/environment behavior score normalized by visited files.