PDLL

Frontend Pattern Language

River Riddle
Background: PDL, Pattern Descriptor Language

This presentation assumes some background on PDL:

- 2021-04-15: Pattern Descriptor Language; [slides - recording](#)
- 2019-12-19: Interpreted Pattern Match Execution; [slides - recording](#)
Introduction
What is PDLL?

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  - Support for all MLIR constructs; Optional, Variadic, Region, Successor, etc.
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    - PDLL patterns can be compiled at runtime
- Designed as a high-level representation of MLIR and PatternRewriter constructs
  - Support for all MLIR constructs; Optional, Variadic, Region, Successor, etc.
- Built with modern language tooling in mind
  - Code completion, go-to-definition, formatting, etc.
Why PDLL?

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```python
// Suppose we have a three result operation, defined as seen below.
def ThreeResultOp : Op("three_result_op") {  
  let arguments = (ins ...);

  let results = (outs
    AnyTensor:$output1,
    AnyTensor:$output2,
    AnyTensor:$output3
  );
}

// To bind the results of 'ThreeResultOp' in a TDRR pattern, we bind all results // to a single name and use a special naming convention: `\_N`, where `N` is the // N-th result.
def : Pattern<(ThreeResultOp:$results ...),
  [(... $results_0), ..., (... $results_2), ...]>
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```python
Pattern {
  // In PDLL, we can directly reference the results of an operation variable.
  let threeResultOp = op<my_dialect.three_result_op>;
  let userOp = op<my_dialect.user_op>(threeResultOp.output1, threeResultOp.output3);
}
```
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- Why not X language?
  - Yes and No
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    - Extra dependencies, environment, performance, tooling, subset of language to support, etc. considerations
  - Yes
    - PDL (the underlying infra) was designed with multiple frontends in mind
    - Different users have different constraints.
Language Demo
Status
Roadmap

- Current Status
  - Everything in the demo
  - Focusing on useful initial feature set (e.g. what is needed to delete TDRR)
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  - Support Blocks and Regions, DialectConversion type conversions, etc.
  - Performance improvements and optimizations for PDL
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  - Support Blocks and Regions, DialectConversion type conversions, etc.
  - Performance improvements and optimizations for PDL
  - Formalize RFC and develop upstream
Thanks