Non-attribute property improvements in MLIR

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History and context

What's a non-attribute property?

We can attach constants and data to operations

Usual way: stored as `Attribute`

```
def MyOp : ... {
  let arguments = (ins ...
    I64Attr:$length,
    UnitAttr:$isBar
  );
}
```

- Immutable
- Uniqued
- Live forever in context

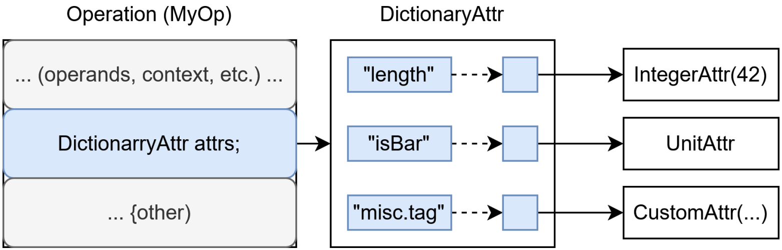
New: Non-attribute property

```
def MyOp : ... {
  let arguments = (ins ...
    I64Prop:$length,
    UnitProp:$isBar
  );
}
```

- Mutable
- Live inline on operation

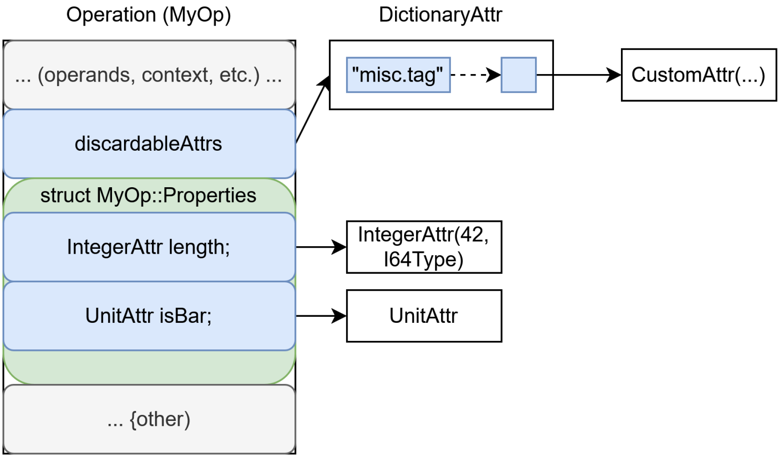
The very old days

All attached data uniqued into uniqued dictionary



Properties structs

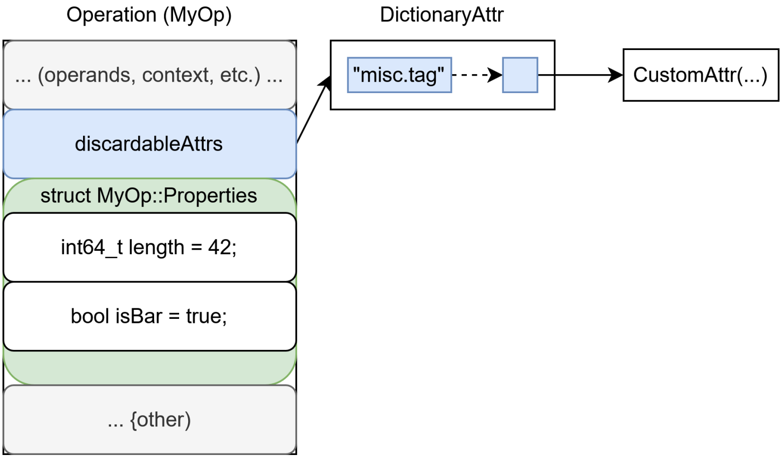
Data inherent to operation moves inline — still uniqued



What we do today

Non-attribute properties

The struct **could** store anything



Rarely used feature — missing infrastructure

New infrastructure

Parsing / printing

```
def MyOp : ... {
  let arguments = (ins ...
    I64Prop:$length,
    UnitProp:$isBar
  );
}
```

```
let assemblyFormat =
  "$length (`bar` $isBar^)?;
```

Now you can have

```
my_op 5 bar
```

without custom parsers/printers

Builders

```
def MyOp : ... {
  let arguments = (ins ...
    I64Prop:$length,
    UnitProp:$isBar
  );
}
```

We now generate

```
MyOp::create(Location loc,
  ...
  int64_t length,
  bool isBar = false);
```

automatically

Other new features

- Combinators
  - `OptionalProp`
  - `ArrayProp`
  - `ConfinedProp` and `PropConstraint`
- Enum generation != attribute genaration - `I*Enum` and `EnumProp`
- Tablegen rewrite patterns handle properties now

Future plans

- Generic builders taking properties structs directly
- `PropRef` and `OwningPropRef`
- Generic parsing/printing of properties — quick and easy stringly-typed FFI

Ongoing discussion and improvement — ideas welcome!