BluePencil: Automating Repetitive Code Edits with Modeless Synthesis

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PROSE

Modeless Synthesis

User asks, Synthesizer provides

What if user does not ask?

- Unaware of the synthesizer
- Breaks workflow
  (especially for programmers)

Watch User, Infer
Spec

For Repetitive Code Edits

```
bool IsValid(string kind, string name) {
    …
}

var childAttrs = child.Attrs().Where(n => IsValid(child.Kind, n.Name));
…
…
…
var parentAttrs = node.Parent.Attrs().Where(n => IsValid(node.Parent.Kind, n.Name));
…
…
…
var currAttrs = node.Attrs().Where(n => IsValid(node.Kind,
n.Name));
…
…
…
var attrs = selected.Attrs().Where(n => IsValid(selected.Kind,
n.Name));
```

Tree.cs

BluePencilDemo | BluePencilDemo.AST | Main()

```
23          // ...
24
25          var childAttrs = child.Attrs();
26
27          // ...
28          // ...
29          // ...
30
31          var parentAttrs = node.Parent.Attrs();
32
33          // ...
34          // ...
35          // ...
36
37          var attrs = selected.Attrs();
38
39          // ...
40          // ...
41          // ...
```

100 % | No issues found | Ln: 25

-- INSERT --

IntelliCode suggestions

Detected edit | File

IntelliCode suggestions | Error List | Output

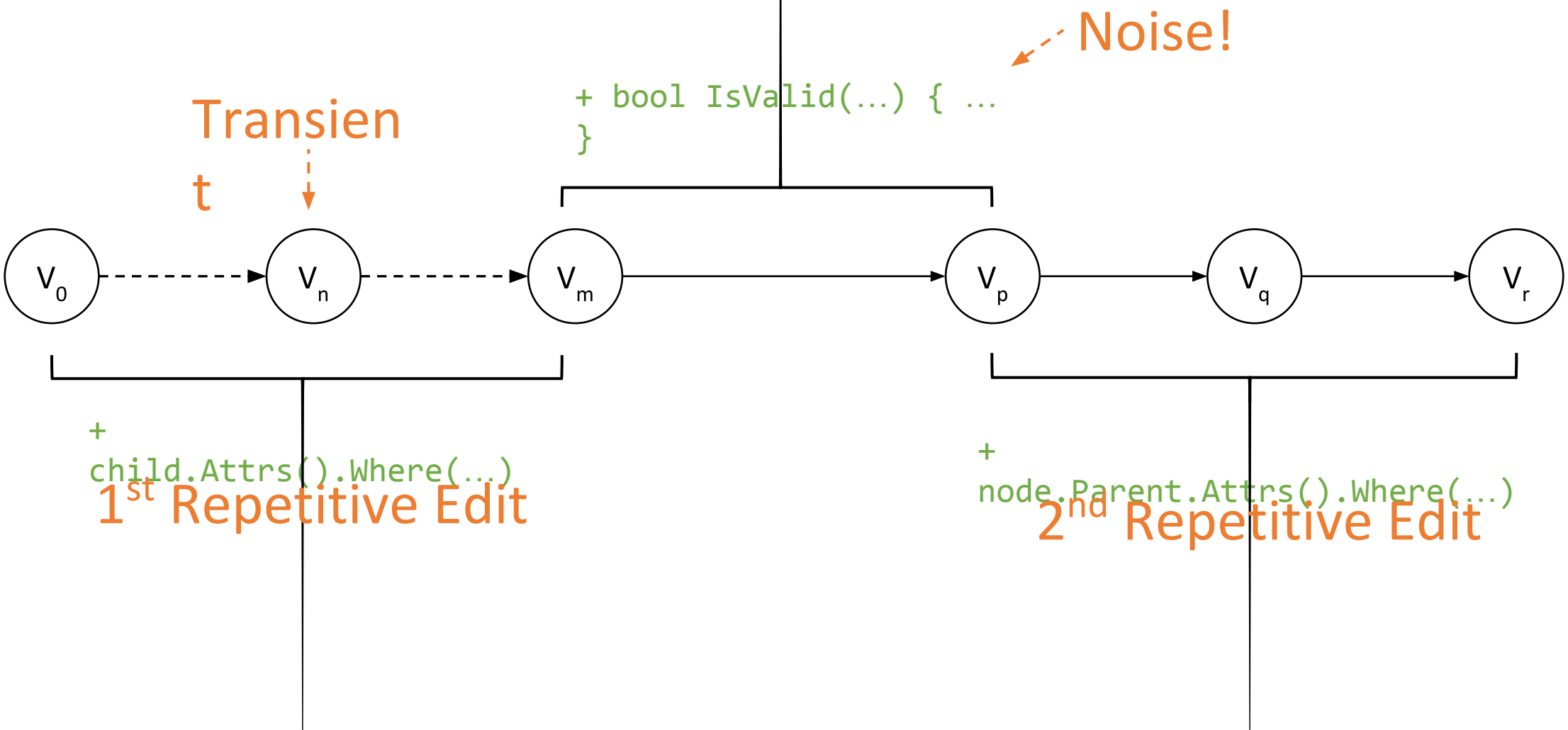
Ready | Add to Sou

Plan of Attack

Record each version into a history

- Guess examples of repetitive edits
- Synthesize edit scripts from examples
- Run edit scripts to produce suggestions

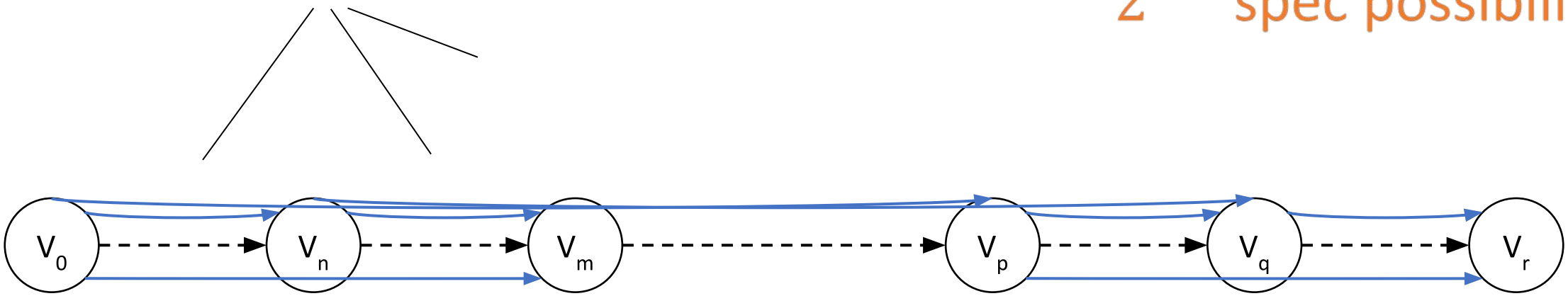
What's the Spec?



What's the Spec?

Potential examples

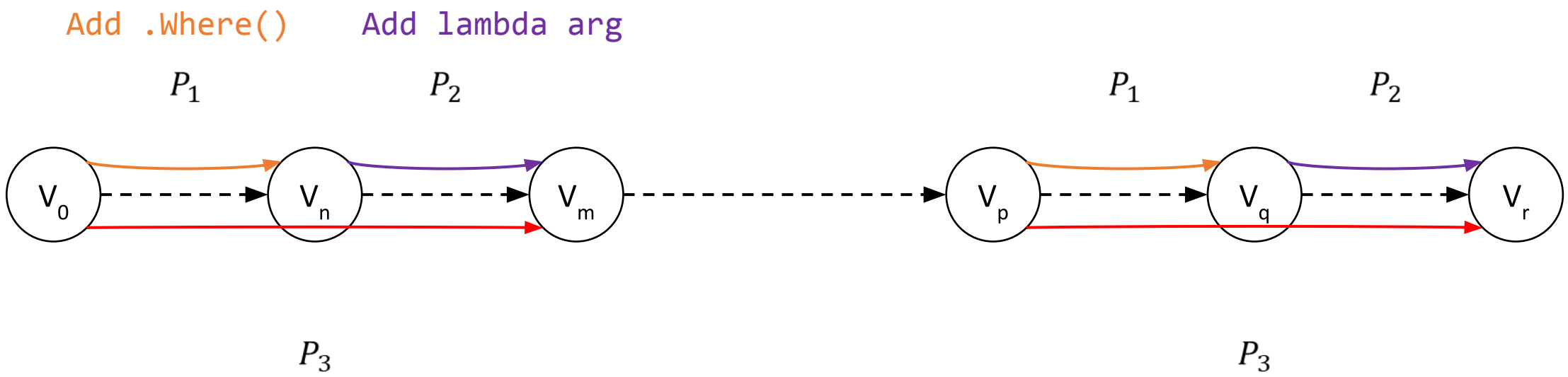
2^{n^2} spec possibilities



Solution: Unsupervised Clustering

Similar edits form good specs.

Edit Program Selection



Which programs to generate suggestions from?

Pick the least colorful path!

Fast and Precise!

$< 250ms$ ≈ 0.9

Preview Release in Visual Studio 2019!

~2500 users accepting suggestions

“I was showing it to my teammate last Friday. It is pretty cool!”

“This is blowing my mind…”

“I’ve just tried IntelliCode refactor in VisualStudio and it’s amazing. What a time saver”

Modeless synthesis

Unsupervised ML to Generate Specs

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