

srcAttributor: Storing Multi-file Variables within Source Code

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Problem

- A variable can affect multiple locations in a program

main.cpp

```
int main() {
  int x = 10;
  int y = 20;
  int z = add(x,y);
}
```

add.cpp

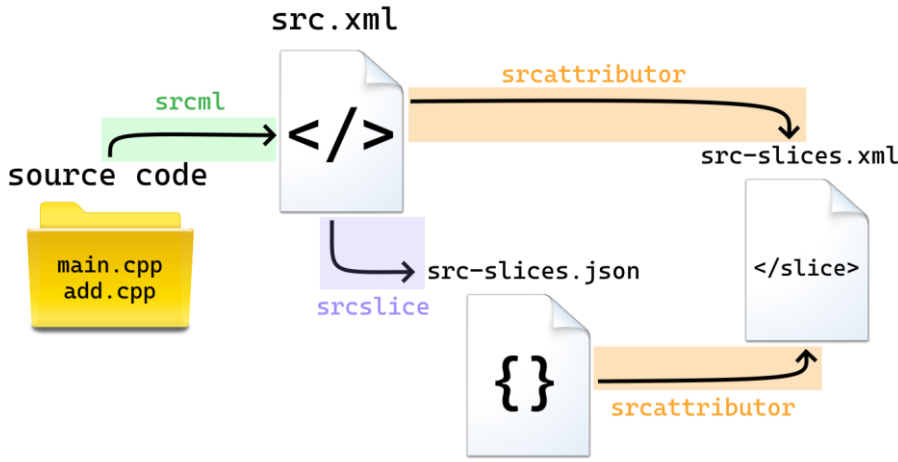
```
int add(int a, int b) {
  return a + b;
}
```

- Slicing produces a subset of lines of the program a variable impacts
- Most programs have multiple source files
- How can a slice be represented across the multiple files?

srcML and srcSlice

- srcML is a software infrastructure that supports analysis of source code. It displays the syntactic aspects of source code using an XML format
- srcSlice is a forward static slicing tool built from srcML. srcSlice allows for program slicing between multiple files

srcAttributor on Multiple Files



- srcAttributor inserts 3 attributes into the srcML structure:
 - slice:decl
 - slice:def
 - slice:use
- These attributes have a hashed value based on:
 - variable name
 - original file
 - row declared
 - column declared

Attribute Result

Embedded slices in src-slices.xml:

```
<decl_stmt><decl slice:decl="718c6d"><type><name>int</name></type><name>x</name>...</decl>
<decl_stmt><decl slice:decl="549e43"><type><name>int</name></type><name>y</name>...</decl>
<decl_stmt><decl slice:use="718c6d 549e43" slice:decl="cb3a20"><type><name>int
</name></type><name>z</name>...</decl>

<function><type><name>int</name></type><name>add</name><parameter_list>(
  <parameter><decl slice:decl="0e614f" slice:use="718c6d"><type><name>int</name></type><name>a
</name></decl></parameter>,
  <parameter><decl slice:decl="116ae6" slice:use="549e43"><type><name>int</name></type><name>b
</name></decl></parameter>)
</parameter_list><block>{<block_content>
  <return>return <expr slice:use="0e614f 116ae6 718c6d 549e43"><name>a</name>
  <operator>+</operator><name>b</name></expr>;</return>
</block_content>}</block></function>
```

main.cpp:

```
int main() {
  int x = 10;
  int y = 20;
  int z = add(x, y);
}
```

add.cpp:

```
int add(int a, int b) {
  return a + b;
}
```

Future Implementations

- srcAttributor is to be implemented as an option in the current srcSlice tool
- The program is being optimized to scale to larger C++ code bases
- Additional language support (e.g., Python, Java)
- srcQL is a syntax-aware query language for srcML
- Using the new structure, querying on the slices of a program is possible
 - FIND src:function CONTAINS SLICE x:2:main.cpp
 - FIND src:expr CONTAINS SLICE y:3:main.cpp