

Milu_F



Current Released Version

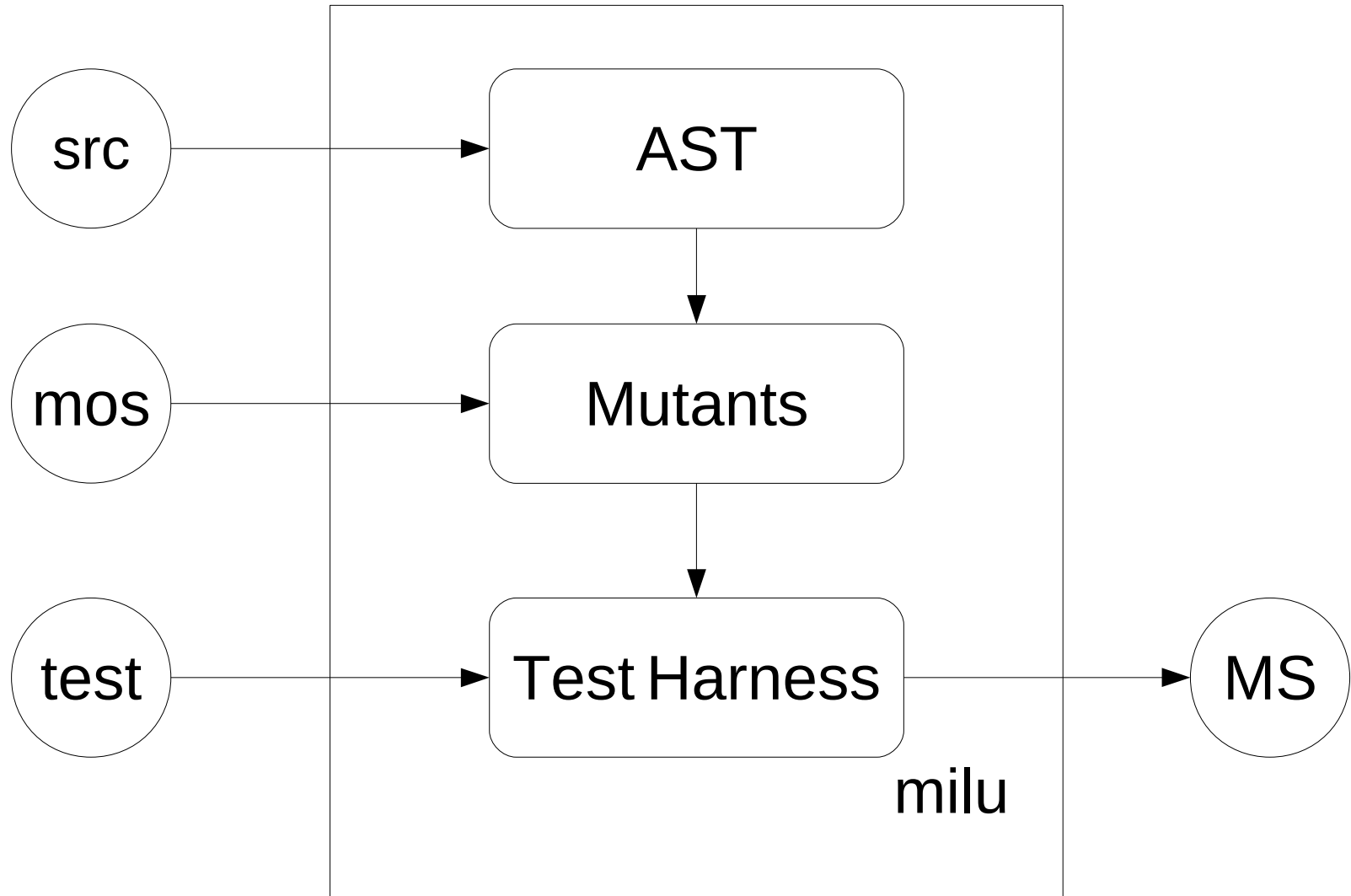
Strong mutation for C

Mutation Operator Script

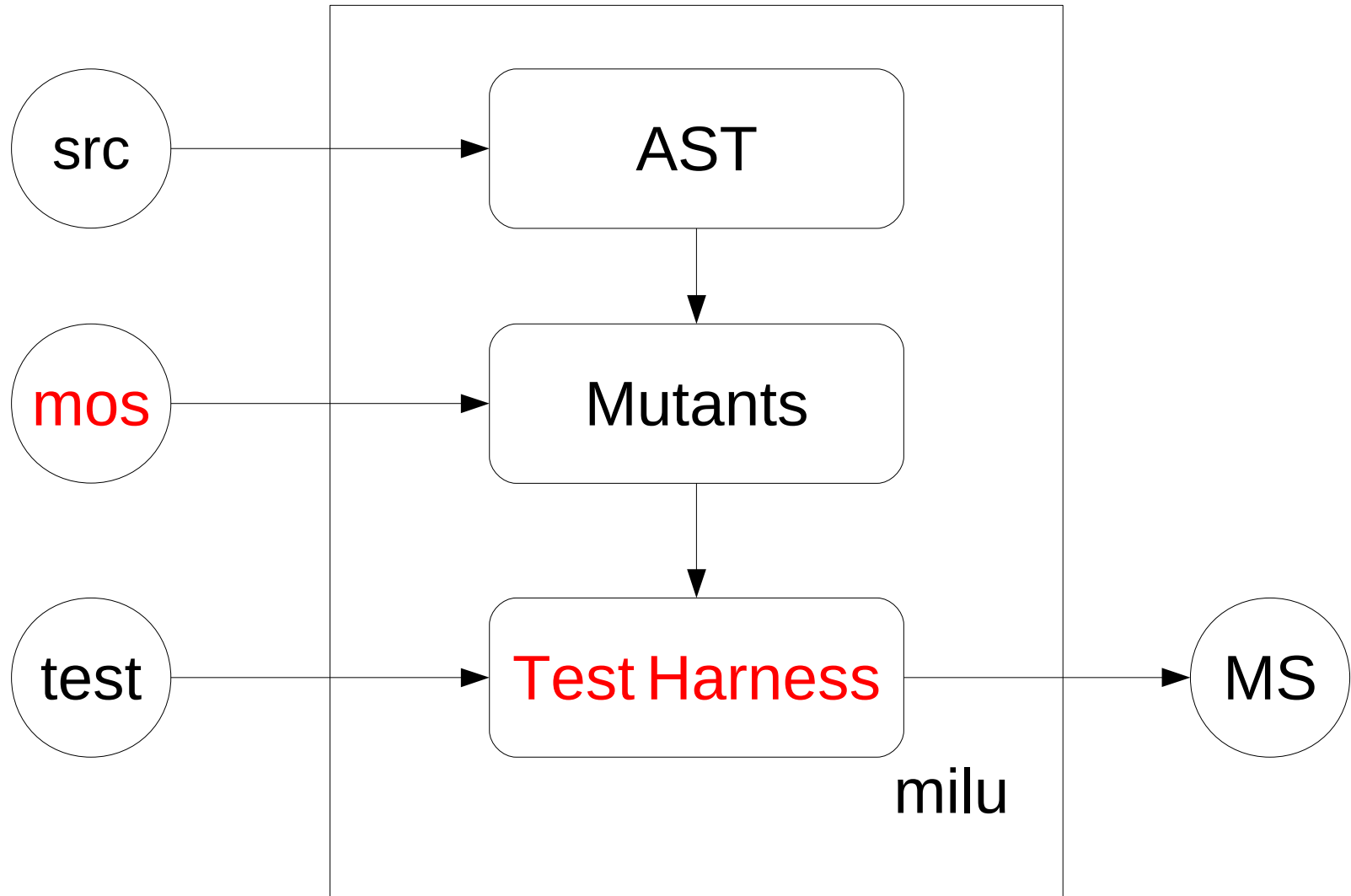
Test harness



Process



Process



Script

A [...] => B [...]

TXL transformation
rule

```
<mop name = " " type = " ">  
  <target>  
    <node></node>  
  </target>  
  <where>  
    <constraint></constraint>  
  </where>  
  <mutation>  
    <operation>  
      <rule></rule>  
    </operation>  
  </mutation>  
</mop>
```

Script

A [...] => B [...]

TXL transformation
rule

```
<mop name = " " type = " ">  
  <target>  
    <node></node>  
  </target>  
  <where>  
    <constraint></constraint>  
  </where>  
  <mutation>  
    <operation>  
      <rule></rule>  
    </operation>  
  </mutation>  
</mop>
```

Script

Simple replacement

e.g. + → -

```
<mop name = " " type = " ">  
  <target>  
    <node> + </node>  
  </target>  
  <mutation>  
    <operation>  
      <rule> - </rule>  
    </operation>  
  </mutation>  
</mop>
```

Script

Multiple replacement

e.g. $+ - * / \% \rightarrow + - * / \%$

<target>

<node> + </node>

<node> - </node>

<node> * </node>

<node> / </node>

<node> % </node>

</target>

Script

Multiple replacement

e.g. $+ - * / \% \rightarrow + - * / \%$

```
<mutation>
  <operation>
    <rule> + </rule>
  </operation>
  <operation>
    <rule> - </rule>
  </operation>
  <operation>
    <rule> * </rule>
  </operation>
  ...
```

Script

Constraint

```
<target>
```

```
  <node>NODE_TYPE_ITERATION_STATEMENT</node>
```

```
</target>
```

```
<where>
```

```
  <constraint type="3" pos="0">MILU_IF</constraint>
```

```
  ...
```

```
</where>
```

Script

Constraint

```
<rule type="14">
```

```
  <node>NODE_TYPE_STATEMENT</node>
```

```
</rule>
```

```
<where>
```

```
  <constraint type="3" pos="0">MILU_RETURN</constraint>
```

```
</where>
```

Script

Advanced Tree Manipulation

Add, Remove and Swap node

```
<rule type=" ... " pos = " ... "
```

User defined function...

```
<mop name="STRI" type="2">
<target>
  <node>NODE_TYPE_ITERATION_STATEMENT</node>
</target>
<where>
<constraint type="3" pos="0">MILU_IF</constraint>
</where>
<mutation>
  <operation>
    <rule type="4" pos="2">milu_trap_on_true(</rule>
    <rule type="4" pos="3">)</rule>
  </operation>
  <operation>
    <rule type="4" pos="2">milu_trap_on_false(</rule>
    <rule type="4" pos="3">)</rule>
  </operation>
</mutation>
</mop>
```

Test harness

Test Suite

```
int test( );
```

```
char * test( );
```

Test Harness

Efficient

Recovery

Kill condition

Time

Loop (Bill Langdon)

Usage

Milu -i src

Milu -m src mop.xml

Milu -t src mop.xml test_suite.c 1 `gcc --args`

Demo

Problems

Slow

Crash

Future plan

Test data generation

Visualization

Week mutation

Mutant Schemata Generation

Milu_H