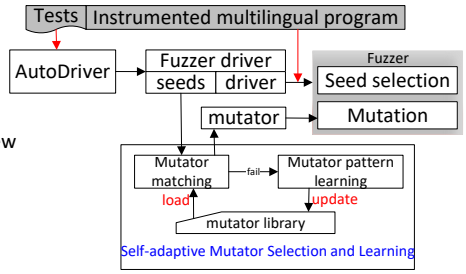
1 Overview



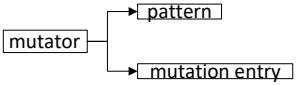
AutoDriver: a tool for generating seeds and drivers automatically.

2 Self-adaptive Mutator Selection

Basic Ideas

1. structural pattern: identify crucial bytes through pilot fuzzing, use these crucial bytes to construct structural pattern. (e.g., Python list, URL, JSON).
2. character pattern: identify the character type of bytes through character analysis to construct character pattern. (e.g., the valid input is the displayable character set).
3. Mutator learning: Build a tool to automatically identify the two patterns, Then construct a corresponding mutator following the three strategies:
   - a> mutate following the patterns
   - b> mutate against the patterns
   - c> mutate randomly
4. Mutator selection: Select a mutator through pattern matching on the seeds and bind it to the seed set and driver.
5. Start fuzzing with the selected mutator.

Mutator definition



Mutator Library

A list of mutators

Mutator Library Construction

Manually Construction

E.g.,
URL: https://github.com/google/AFL

Pattern: http[s]?://[a-zA-Z0-9\.\-/]+
Mutation: -> syntax-maintained mutation
-> length-varied mutation
-> random mutation

Automatic Pattern Learning

1. Pilot fuzzing:
   a> Define threshold P as the least length of valid path .
   b> Mutate the byte one by one and get the length of execution path as *p*.
   c> iff p <= P, consider the byte as crucial byte and further identify its range. Done? d> : a>
   d> Collect the crucial bytes to construct pattern

2. Character analysis:
   a> Analyze the bytes one by one and get the char types
   b> Collect all char types of the tests as character pattern

3. Construct mutator:
   a> Construct template according to the two patterns
   b> Construct mutator based on the template
   c> Store the learned mutator to the mutator library