1.3.0 vs 1.4.0

Arg: 1

CreditCardValidator:4 function add static

EmailValidator: 22

private static final Pattern LEGAL\_ASCII\_PATTERN = Pattern.compile("^\\p{ASCII}+$");

private static final Pattern EMAIL\_PATTERN = Pattern.compile("^(.+)@(.+)$");

private static final Pattern IP\_DOMAIN\_PATTERN = Pattern.compile("^\\[(.\*)\\]$");

private static final Pattern TLD\_PATTERN = Pattern.compile("^([a-zA-Z]+)$");

private static final Pattern USER\_PATTERN = Pattern.compile("^\\s\*" + WORD + "(\\." + WORD + ")\*$");

private static final Pattern DOMAIN\_PATTERN = Pattern.compile("^" + ATOM + "(\\." + ATOM + ")\*\\s\*$");

private static final Pattern ATOM\_PATTERN

function : isValid

isValidDomain

isValidUser

isValidIpAddress

isValidSymbolicDomain

Field:42

Attr: clientValidation

Function :

isClientValidation

setClientValidation

getIndexedPropertySize

Form: 0

FormSet :11

Function : merge

GenericTypeValidator:11

Function formatDate

ISBNValidator:10

Function :isValid

Sum

Clean

toInt

isFormatted

isValidPattern

UrlValidator: 44

SCHEME\_CHARS

SCHEME\_PATTERN

private static final String PATH\_PATTERN = "/^(/[-\\w:@&?=+,.!/~\*'%$]\*)?$/";

private static final String QUERY\_PATTERN = "/^(.\*)$/";

private static final String LEGAL\_ASCII\_PATTERN = "/^[\\000-\\177]+$/";

private static final String IP\_V4\_DOMAIN\_PATTERN =

"/^(\\d{1,3})[.](\\d{1,3})[.](\\d{1,3})[.](\\d{1,3})$/";

private static final String DOMAIN\_PATTERN =

"/^" + ATOM + "(\\." + ATOM + ")\*$/";

private static final String PORT\_PATTERN = "/^:(\\d{1,5})$/";

private static final String ATOM\_PATTERN = "/(" + ATOM + ")/";

private static final String ALPHA\_PATTERN = "/^[" + ALPHA\_CHARS + "]/";

function

isValidAuthority

isValidPath

isValidQuery

isValid

isValidScheme

ValidatorResources: 19

Attr:VALIDATOR\_RULES

ValidatorResult:8

Function

ResultStatus

ValidatorUtils: 8

Function copyMap

AbstractCalendarValidator:30

dateStyle

timeStyle

line change 210 added

class 10

functions:22

"EmailValidator.isValid",

"EmailValidator.isValidDomain",

"EmailValidator.isValidUser",

"EmailValidator.isValidIpAddress",

"EmailValidator.isValidSymbolicDomain",

"Field.isClientValidation",

"Field.setClientValidation",

"Field.getIndexedPropertySize",

"FormSet.merge",

"ISBNValidator.isValid",

"ISBNValidator.Sum",

"ISBNValidator.Clean",

"ISBNValidator.toInt",

"ISBNValidator.isFormatted",

"ISBNValidator.isValidPattern",

"UrlValidator.isValidAuthority",

"UrlValidator.isValidPath",

"UrlValidator.isValidQuery",

"UrlValidator.isValid",

"UrlValidator.isValidScheme",

"ValidatorResult.ResultStatus",

"ValidatorUtils.copyMap",

invariants changes:

1.6

CalendarValidationTest 9

ByteTest 8

FlagsTest 11

1.5

CalendarValidationTest 9

ByteTest 8

FlagsTest 11

1.4

CalendarValidationTest 9

ByteTest 8

FlagsTest 11

1.3.0 vs 1.5.0

CreditCardType:33

Amex:1

Function:matches

EmailValidator:22

Function

isValid

isValidDomain

isValidUser

isValidIpAddress

isValidSymbolicDomain

stripComments

field 81

function

addMsg

getMessage

getMessages

addArg

ensureArgsCapacity

addVar

getVar

getVarValue

getVars

process

processVars

processMessageComponents

processArg

runDependentValidators

validate

Form:32

getField

containsField

merge

process

validate

FormSet:18

Merge

displayKey

GenericTypeValidator 60

formatByte

formatShort

formatInt

formatLong

formatFloat

formatDouble

formatDate

GenericValidator 12

matchRegexp

isDate

ISBNValidator 10

isValid

sum

clean

toInt

isFormatted

isValidPattern

UrlValidator:53

isValid

isValidScheme

isValidAuthority

isValidPath

isValidQuery

isValidFragment

Validator:21

Validate

ValidatorAction:64

executeValidationMethod

loadValidationClass

getParameterValues

isValid

ValidatorResources:51

ValidatorResources

initDigester

addFormSet

addValidatorAction

getValidatorAction

getValidatorActions

getForm

processForms

ValidatorResults：12

getPropertyNames

AbstractNumberValidator：19

minValue

ByteValidator：24

processParsedValue

DoubleValidator：23

processParsedValue

LongValidator：23

processParsedValue

ShortValidator：24

processParsedValue

Flags：14

isOn

turnOnAll

ValidatorUtils：17

getValueAsString

copyFastHashMap

copyMap

class 20

line of code 749

function 74

CreditCardValidator：38

isValid

EmailValidator：25

isValid

isValidDomain

isValidUser

isValidIpAddress

isValidSymbolicDomain

stripComments

field：84

addMsg

getMessage

addArg

ensureArgsCapacity

getArg

addVar

getVar

getVarValue

process

processVars

processMessageComponents

processArg

getDependencyList

clone

validateForRule

runDependentValidators

validate

Form：34

getField

addField

getFields

containsField

merge

process

validate

FormSet：20

Merge

getForm

process

displayKey

GenericTypeValidator：65

formatByte

formatByte

formatShort

formatShort

formatInt

formatLong

formatLong

formatDate

formatFloat

formatDouble

GenericValidator：12

matchRegexp

isDate

ISBNValidator：11

isValid

sum

clean

toInt

isFormatted

isValidPattern

UrlValidator：55

isValid

isValidScheme

isValidAuthority

isValidPath

isValidQuery

isValidFragment

validator：21

clear

validate

ValidatorAction：66

readJavascriptFile

generateJsFunction

getDependencyList

loadValidationClass

loadParameterClasses

getParameterValues

isValid

getClassLoader

onlyReturnErrors

ValidatorResult：15

isValid

getResult

getActions

getActionMap

ValidatorResults：13

getValidatorResult

getPropertyNames

getResultValueMap

Flags：14

isOn

turnOnAll

ValidatorUtils：17

getValueAsString

copyFastHashMap

copyMap

AbstractCalendarValidator：37

Compare

AbstractFormatValidator：17

ByteValidator：26

processParsedValue

CurrencyValidator：12

Parse

DoubleValidator：24

processParsedValue

IntegerValidator：26

processParsedValue

LongValidator：25

processParsedValue

PercentValidator：14

Parse

ShortValidator：26

processParsedValue

Class 24

Line of code 697

Function 90

Result:1.4.0 32

8

F:\Regression2\Daikon\1.3.0\CalendarValidatorTest.txt 9

25

F:\Regression2\Daikon\1.3.0\LocaleTest.txt 5

34

F:\Regression2\Daikon\1.3.0\RetrieveFormTest.txt 5

28

F:\Regression2\Daikon\1.3.0\MultipleConfigFilesTest.txt 5

6

F:\Regression2\Daikon\1.3.0\ByteTest.txt 8

Result : 1.5.0 197

F:\Regression2\Daikon\1.3.0\BigDecimalValidatorTest.txt 11

5

F:\Regression2\Daikon\1.3.0\BigIntegerValidatorTest.txt 11

6

F:\Regression2\Daikon\1.3.0\ByteTest.txt 8

7

F:\Regression2\Daikon\1.3.0\ByteValidatorTest.txt 11

8

F:\Regression2\Daikon\1.3.0\CalendarValidatorTest.txt 9

9

F:\Regression2\Daikon\1.3.0\CreditCardValidatorTest.txt 2

11

F:\Regression2\Daikon\1.3.0\DateTest.txt 2

13

F:\Regression2\Daikon\1.3.0\DoubleTest.txt 6

14

F:\Regression2\Daikon\1.3.0\DoubleValidatorTest.txt 11

17

F:\Regression2\Daikon\1.3.0\ExtensionTest.txt 8

19

F:\Regression2\Daikon\1.3.0\FlagsTest.txt 11

20

F:\Regression2\Daikon\1.3.0\FloatTest.txt 6

21

F:\Regression2\Daikon\1.3.0\FloatValidatorTest.txt 12

22

F:\Regression2\Daikon\1.3.0\GenericValidatorTest.txt 2

23

F:\Regression2\Daikon\1.3.0\IntegerTest.txt 8

24

F:\Regression2\Daikon\1.3.0\IntegerValidatorTest.txt 11

25

F:\Regression2\Daikon\1.3.0\LocaleTest.txt 5

26

F:\Regression2\Daikon\1.3.0\LongTest.txt 8

27

F:\Regression2\Daikon\1.3.0\LongValidatorTest.txt 11

28

F:\Regression2\Daikon\1.3.0\MultipleConfigFilesTest.txt 5

29

F:\Regression2\Daikon\1.3.0\MultipleTests.txt 8

32

F:\Regression2\Daikon\1.3.0\RequiredIfTest.txt 5

33

F:\Regression2\Daikon\1.3.0\RequiredNameTest.txt 6

34

F:\Regression2\Daikon\1.3.0\RetrieveFormTest.txt 5

36

F:\Regression2\Daikon\1.3.0\ShortTest.txt 6

37

F:\Regression2\Daikon\1.3.0\ShortValidatorTest.txt 11

44

F:\Regression2\Daikon\1.3.0\TypeTest.txt 3

45

F:\Regression2\Daikon\1.3.0\ValidatorResultsTest.txt 2

46

F:\Regression2\Daikon\1.3.0\ValidatorTest.txt4

Result:1.6.0 194

F:\Regression2\Daikon\Alg>python Alg1.py

{5: 1, 6: 1, 7: 1, 8: 1, 9: 1, 11: 1, 13: 1, 14: 1, 17: 1, 18: 1, 19: 1, 20: 1, 22: 1, 23: 1, 24: 1, 25: 1, 26: 1, 27: 1, 28: 1, 29: 1, 32: 1, 33: 1, 34: 1, 36: 1, 37: 1, 44: 1, 45: 1, 46: 1}

5

F:\Regression2\Daikon\1.3.0\BigIntegerValidatorTest.txt 11

6

F:\Regression2\Daikon\1.3.0\ByteTest.txt 8

7

F:\Regression2\Daikon\1.3.0\ByteValidatorTest.txt 11

8

F:\Regression2\Daikon\1.3.0\CalendarValidatorTest.txt 9

9

F:\Regression2\Daikon\1.3.0\CreditCardValidatorTest.txt 2

11

F:\Regression2\Daikon\1.3.0\DateTest.txt 2

13

F:\Regression2\Daikon\1.3.0\DoubleTest.txt 6

14

F:\Regression2\Daikon\1.3.0\DoubleValidatorTest.txt 11

17

F:\Regression2\Daikon\1.3.0\ExtensionTest.txt 8

18

F:\Regression2\Daikon\1.3.0\FieldTest.txt 9

19

F:\Regression2\Daikon\1.3.0\FlagsTest.txt 11

20

F:\Regression2\Daikon\1.3.0\FloatTest.txt 6

22

F:\Regression2\Daikon\1.3.0\GenericValidatorTest.txt 2

23

F:\Regression2\Daikon\1.3.0\IntegerTest.txt 8

24

F:\Regression2\Daikon\1.3.0\IntegerValidatorTest.txt 11

25

F:\Regression2\Daikon\1.3.0\LocaleTest.txt 5

26

F:\Regression2\Daikon\1.3.0\LongTest.txt 8

27

F:\Regression2\Daikon\1.3.0\LongValidatorTest.txt 11

28

F:\Regression2\Daikon\1.3.0\MultipleConfigFilesTest.txt 5

29

F:\Regression2\Daikon\1.3.0\MultipleTests.txt 8

32

F:\Regression2\Daikon\1.3.0\RequiredIfTest.txt 5

33

F:\Regression2\Daikon\1.3.0\RequiredNameTest.txt 6

34

F:\Regression2\Daikon\1.3.0\RetrieveFormTest.txt 5

36

F:\Regression2\Daikon\1.3.0\ShortTest.txt 6

37

F:\Regression2\Daikon\1.3.0\ShortValidatorTest.txt 11

44

F:\Regression2\Daikon\1.3.0\TypeTest.txt 3

45

F:\Regression2\Daikon\1.3.0\ValidatorResultsTest.txt 2

46

F:\Regression2\Daikon\1.3.0\ValidatorTest.txt 4

F:\Regression2\Daikon\Alg>

Between 1.4.0 ，1.5.0

To answer that , I run a experiment.

First :That find the different between 1.4.0 and 1.5.0’s changed functions.

Run algorithm on changed functions only in 1.4.0 , so as to 1.5.0

Then: Compare the two results, filter the same , keep the difference as D1.4.0 and D1.5.0.

Third: Run algorithm on the changed functions which included in both 1.4.0 and 1.5.0 as D2.

Fourth: Compare the D1.4.0 with D2 and D1.5.0 with D2.

If test cases show in D1.4.0 but not in D2 then , this is unique one to the D1.5.0

If test cases show in D1.5.0 but not in D2 then , this is unique one to the D1.4.0

Result:

Step 2：D1.4.0 remains Test suite with index 33 and 9 : {33,9}

D1.5.0 remains Test suite with index {7, 14, 21, 27, 37}

Step 3：Get Test suite with index

{6, 7, 9, 11, 13, 14, 17, 19, 20, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 36, 37, 44, 45, 46}

Step 4： Only different is 21 which is FloatValidatorTest and be selected by changed invariant.

The result shows, There were some different changes be made to the program and algorithm select different test suits for these different changes. However, most of these test suit were already be selected by the common part. The only different part are selected by the changed invariant which result in thought the changes are different but the selected test cases are the same.

Step 1’s result

Case 1 : The function modified in 1.4.0 but not shows up in 1.5.0 are

'CreditCardType.matches', 'field.process', 'field.processVars', 'field.runDependentValidators', 'field.validate', 'Validator.Validate', 'ValidatorAction.executeValidationMethod', 'ValidatorResources.ValidatorResources', 'ValidatorResources.initDigester', 'ValidatorResources.addFormSet', 'ValidatorResources.addValidatorAction', 'ValidatorResources.getValidatorAction', 'ValidatorResources.getValidatorActions', 'ValidatorResources.getForm', 'ValidatorResources.processForms', 'AbstractNumberValidator.minValue'

Case 2 : The function modified in 1.5.0 but not shows up in 1.4.0 are

'CreditCardValidator.isValid', 'Field.processMessageComponents', 'Field.processArg', 'Field.getDependencyList', 'Field.clone', 'Field.validateForRule', 'Form.addField', 'Form.getFields', 'FormSet.getForm', 'FormSet.process', 'GenericTypeValidator.formatLong ', 'validator.clear', 'validator.validate', 'ValidatorAction.readJavascriptFile', 'ValidatorAction.generateJsFunction', 'ValidatorAction.getDependencyList', 'ValidatorAction.loadParameterClasses', 'ValidatorAction.getClassLoader', 'ValidatorAction.onlyReturnErrors', 'ValidatorResult.isValid', 'ValidatorResult.getResult', 'ValidatorResult.getActions', 'ValidatorResult.getActionMap', 'ValidatorResults.getValidatorResult', 'ValidatorResults.getResultValueMap', 'AbstractCalendarValidator.Compare', 'CurrencyValidator.Parse', 'IntegerValidator.processParsedValue', 'PercentValidator.Parse'

Case 3 :In common is :

'EmailValidator.isValid', 'EmailValidator.isValidDomain', 'EmailValidator.isValidUser', 'EmailValidator.isValidIpAddress', 'EmailValidator.isValidSymbolicDomain', 'EmailValidator.stripComments', 'Form.getField', 'Form.containsField', 'Form.merge', 'Form.process', 'Form.validate', 'FormSet.Merge', 'FormSet.displayKey', 'GenericTypeValidator.formatByte', 'GenericTypeValidator.formatByte', 'GenericTypeValidator.formatShort', 'GenericTypeValidator.formatShort', 'GenericTypeValidator.formatInt', 'GenericTypeValidator.formatLong', 'GenericTypeValidator.formatDate', 'GenericTypeValidator.formatDouble', 'GenericValidator.matchRegexp', 'GenericValidator.isDate', 'ISBNValidator.isValid', 'ISBNValidator.sum', 'ISBNValidator.clean', 'ISBNValidator.toInt', 'ISBNValidator.isFormatted', 'ISBNValidator.isValidPattern', 'UrlValidator.isValid', 'UrlValidator.isValidScheme', 'UrlValidator.isValidAuthority', 'UrlValidator.isValidPath', 'UrlValidator.isValidQuery', 'UrlValidator.isValidFragment', 'ValidatorAction.loadValidationClass', 'ValidatorAction.getParameterValues', 'ValidatorAction.isValid', 'ValidatorResults.getPropertyNames', 'Flags.isOn', 'Flags.turnOnAll', 'ValidatorUtils.getValueAsString', 'ValidatorUtils.copyFastHashMap', 'ValidatorUtils.copyMap', 'ByteValidator.processParsedValue', 'DoubleValidator.processParsedValue', 'LongValidator.processParsedValue', 'ShortValidator.processParsedValue'

There are some test cases can cover multiple changes. The unique changes made in 1.4.0 and 1.5.0 can be covered by test cases for common changes in 1.4.0 and 1.5.0 which results in the selection result is the same.

To prove that I found the unique function changes that only made in 1.4.0 , but not in 1.5.0 .Apply these unique function changes in to algorithm can get selected test suites called D1.4.0 and do the same to 1.5.0 , get result call D1.5.0

Because D1.4.0 and D1.5.0 are associated with unique function changes were made in the two versions. They represent the difference in selection.

By filtering out with selection result of the common function changes to the 1.3.0 . D1.4.0 are already covered by the common changes and D1.5.0 are covered by the common changes,except test case FloatValidatorTest.

However this test cases selected by changed invariants in both 1.4.0 and 1.5.0

Thus the selection result of 1.4.0 and 1.5.0 is the same .

Step 1: That find the difference between 1.4.0 and 1.5.0’s changed functions.

Run algorithm on changed functions only in 1.4.0, so as to 1.5.0

Step 2: Compare the two results, filter the same, keep the difference as D1.4.0 and D1.5.0.

Step 3: Run algorithm on the changed functions which included in both 1.4.0 and 1.5.0 as D2.

Step 4: Compare the D1.4.0 with D2 and D1.5.0 with D2.

If test cases show in D1.4.0 but not in D2 then, this is unique one to the D1.5.0

If test cases show in D1.5.0 but not in D2 then, this is unique one to the D1.4.0

Result:

Step 2：D1.4.0  remains Test suite with index 33 and 9 : {33,9}

D1.5.0 remains Test suite with index {7, 14, 21,  27, 37}

Step 3：Get Test suite with index

{6, 7, 9, 11, 13, 14, 17, 19, 20, 22, 23, 25, 26, 27, 28, 29, 32, 33, 34, 36, 37, 44, 45, 46}

Step 4： Only difference is 21  which is  FloatValidatorTest and be selected by changed invariant.